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THE

AMERICAN JOURNAL OF PHARMACY.

PUBLISHED BY AUTHORITY OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

EDITED BY

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AND

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NEW SERIES, VOL. VII.

—42

PHILADELPHIA
MERRIHEW AND THOMPSON, PRINTERS.
No. 7 Carter's Alley.
1842.

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VOL. XIII.

NEW SERIES.—VOL. VII.[...]

APRIL, 1841.

PHILADELPHIA:

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Price $2 50 a year, in advance[...]

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PHARMACY.

APRIL, 1841.

ART. I.—ON LOBELINA, THE ACTIVE PRINCIPLE OF LOBELIA INFLATA, AND ON SOME OTHER PROXIMATE PRINCIPLES OF THE SEED OF THAT PLANT. By William Procter, Jr.

In the ninth volume of this Journal (1838) was published an essay on *Lobelia inflata* by the author of this communication, which embraced a chemical analysis of the plant. According to that analysis, the following named substances were contained in the plant, viz.—*gum, gallic acid, resin and chlorophylle, fixed oil, a peculiar acrid alkaline principle, salts of lime and potassa, oxide of iron and lignin.* It was stated that the active principle of the plant was destroyed or injured by much heat, without determining the cause of the phenomenon, or exposing the peculiar circumstances under which it happened.

This active principle was described as possessing alkaline properties, as capable of forming crystalline salts with acids, and as having a brown color and semifluid consistence. The sequel will demonstrate the conditions under which this active principle is affected by heat, and the means of rendering it permanent, as well as exhibit a more detailed description of the principle itself.

In volume 5th, page 300, of this Journal, is an essay "*On*

Lobelia, the active principle of Lobelia inflata, by S. Colhoun, M. D.,* Professor of Materia Medica in Jefferson Medical College." At the period that my former essay was written, this paper by Dr. C. was cursorily examined, but the fact that his active principle was *insoluble in ether*, at once caused a belief that the principles were different, and that, that contained in my essay was unique. A subsequent and more critical examination of Dr. C.'s paper has led to the conclusion that he did not succeed in isolating lobelina, but that his principle was an impure hydrochlorate of that base, as is evident from the following extract from his paper, viz:

"The process by which this active principle was obtained, was first by dissolving it in acidulated water; muriatic acid being used for this purpose, the menstruum continued to act on the leaves for seven hours; it was then evaporated, the heat separating the superfluous acid.

"Crystals, on the fluid being sufficiently reduced, were discovered on the bottom of the vessel: they were mixed with some foreign earthy salt, the existence of which was proved by burning the substance remaining after the evaporation, in a small bottle kept for some hours in a red heat.

"To avoid the salts thus formed with the acid, alcohol was used as the solvent; the extract remaining after its evaporation was beautifully transparent, and had the other properties above described. [Alluding to a previous description.] It was this extract that was principally used to form salts with the acids."

From these remarks it is evident, that the substance described as lobelina, was really a mixture of the hydrochlorate of that base, with such other matter as alcohol will extract from the watery extract of *Lobelia inflata*. Hence, this *principle* could not have had an *alkaline reaction*, and there is no mention made in the paper of its possessing this reaction. It states that "lobelia [lobelina] *forms salts* with the acids," not that it *neutralizes* acids; and consequently we are led to believe

* An acknowledgement was due Dr. Colhoun for omitting a notice of his paper in the essay before mentioned. Since the present essay has been prepared, we lament to state that his death has occurred.

that the salts of Dr. C. were mixtures severally of the acids which gave them names, with the impure hydrochlorate of lobelina.

Speaking of the active principle, the Doctor remarks, "It is very soluble in alcohol; *scarcely, if at all, in ether:* in this respect it differs from nicotine: the active principle of *Lobelia inflata does not even color ether to which it has been added.*" This declaration is a further evidence that the active principle of Dr. Colhoun was not lobelina, *for of all the solvents of that base, none dissolve it so readily as ether:* and as Dr. C.'s principle was insoluble in that menstruum, it follows that, if lobelina, it must have been combined with an acid, in which state it is much less soluble in ether.

In a work on Materia Medica by Jonathan Pereira, professor of Materia Medica, &c. &c., at London, published in 1840. is the following under the head of *Lobelia inflata*, viz.:

"*Composition.* No accurate analysis of this plant has hitherto been made. Dr. Colhoun has announced the existence of a peculiar principle in this plant. From some experiments I have recently made on lobelia, I find that it contains *a volatile acrid principle*, (oil?) an acid, (peculiar?) resin, gum, &c. &c.

"*Vol. acrid principle.* Water distilled from lobelia has the peculiar smell and nauseous acrid taste of the plant. In one experiment I obtained a thin film, of what appeared to be a solid volatile oil. The distilled water is unaffected by acids, sesquichloride of iron, or tincture of galls."

"*An acid* (lobelic acid?) A decoction of lobelia reddens litmus, and becomes on the addition of sesquichloride of iron of a dark olive brown, and in a short time a precipitate is formed. (Lobeliate of iron.) Sulphate of copper gives rise to a green precipitate. (Lobeliate of copper.) Nitrate of silver causes a slight precipitate. (Lobeliate of silver.")

The object for which the above extracts are inserted is to notice their contents in detail.

1st. Professor Pereira states that he has obtained a *volatile acrid principle* from the *Lobelia inflata* which he infers to

be an oil. By reference to experiments 4th, 5th and 6th, of my former essay on this subject, it will be seen that this point has been fairly tested. A saturated tincture of the leaves of lobelia was distilled, and the product was found to possess the odor but *not* the acrid taste of the plant. Again—lobelia was subjected to distillation with water, and the distilled liquid returned upon a fresh portion of the plant, but the result was merely an odorous water, without any acrimony or any taste that could be said to approach it. To place this matter in a clear light, the experiments just mentioned (which were originally intended to prove the presence of a *volatile odorous principle*, but not *a volatile acrid principle*,) were repeated; lobelia was distilled and redistilled, but the results have been as above detailed; hence, the inference follows, that some accidental cause must have influenced the product of Professor Pereira.

2d. With regard to "lobelic acid" little can be learned from Professor Pereira's remarks above quoted. By referring to the first page of this article it will be seen, that the acidity of the decoction of lobelia was attributed to gallic acid. From an extended inquiry into the nature of this acid, which will be found in the sequel, it appears to be peculiar to the plant, but very like gallic acid in several of its reactions, which accounts for its having been mistaken for that acid. With these preliminary remarks, which have been made in justice to my own, and to the essays of the gentlemen respectively to whom they apply, the regular matter of this paper will be resumed.

Fixed oil. One ounce of the seed of *Lobelia inflata*, finely bruised, was macerated in two fluid ounces of sulphuric ether, 54° Baumé, for eight days with occasional agitation. The ethereal liquor was then decanted, and the seed placed on a displacement filter, and treated with ether until exhausted. This product was mixed with the first and allowed to evaporate spontaneously. Two drachms and a half of a green fixed oil was thus obtained. Besides this oil about twenty grains of a brown substance was left after the evaporation of the ether, held in solution by the alcohol contained in the ether. This substance had an extremely acrid taste, owing to its containing

a portion of the natural salt of lobelina. The green color of the oil is due to chlorophylle, derived from minute portions of the leaves of the plant being mixed with the seeds.

A portion of the seed finely bruised was subjected to pressure, surrounded by bibulous paper, and the latter, after the removal of all extraneous matter from its surface, was macerated in ether, which was subsequently evaporated. The oil thus obtained had very little color, and by exposure becomes limpid. Its specific gravity is .940°. The most prominent quality of this fixed oil is a tendency to the rapid absorption of oxygen, and hence it is one of the drying oils. So much is this the case, that a portion of oil in a shallow capsule became solid in two weeks, and when removed from the vessel had the appearance of fragments of gum arabic. A small quantity of white paint was prepared with this oil, and it was found to dry even more rapidly than linseed oil. The seeds contain about 30 per cent. of fixed oil.

Resin. When a tincture of the seeds made with alcohol 30° B., is evaporatad, a brown colored substance gradually precipitates, which, when dried, has the characters of resin.

Gum. A decoction of the seed of lobelia is precipitated abundantly by subacetate of lead, but is not affected by solution of iodine, gelatin, or ferrocyanuret of potassium.

Lobelic acid. A decoction of the leaves of lobelia is precipitated dark olive brown by sesquichloride and persulphate of iron ; green by sulphate of copper ; deep brown by nitrate of silver; reddish brown by lime and baryta waters, and is not affected by pure soda or the chloride of calcium or barium.—From the peculiar effects of metallic salts on the decoction, Professor Pereira inferred the presence of a peculiar acid which he designated *lobelic acid*, in case future experiment should prove its claim to the title.

One ounce of lobelia leaves in powder was boiled in half a pint of water for half an hour ; when cold, the decoction was filtered, and sulphate of copper added as long as it caused a precipitate. This was collected on a filter and washed with water until the washings ceased to taste or evince an acid re-

action with litmus paper. This precipitate was suspended in water, and a current of hydrosulphuric acid was passed through the mixture, until from a green, its previous color, it had assumed a uniform deep brown hue, when it was gently heated and filtered. The brown precipitate was principally sulphuret of copper.

The filtered liquor had an acid reaction, and was evaporated carefully to dryness, yielding a dark colored extract. This was treated with boiling ether, and the ethereal solution allowed to evaporate to dryness spontaneously. A mass of a yellow color and semi-crystalline texture was obtained which instantly turned the blue color of litmus to red when applied to it in a damp state. By treating this product with cold ether and evaporating, the acid is obtained purer and in imperfect crystals. In this state, lobelic acid, when in solution, is precipitated light green by sulphate of copper; olive brown by persulphate of iron; yellow by acetate of lead; yellow by baryta water; and grayish white by nitrate of mercury. It is not precipitated by chloride of barium.

The action of heat on the active principle of Lobelia inflata.—Six ounces of lobelia seeds, in a bruised state, were macerated in twelve fluid ounces of water, acidulated with two drachms of acetic acid for three days; the infusion pressed out, saturated with magnesia and filtered. This solution had a dark greenish color and a very acrid taste. One half of it was put in a capsule on a water bath and evaporated to dryness. The extract thus obtained was *entirely without the acrimony* peculiar to lobelia, and which was so strongly manifested by the infusion previous to subjecting it to heat. The other portion of the infusion was treated with ether, and the ethereal liquor separated and permitted to evaporate. The product had a powerful acrid taste and alkaline reaction.

It was observed that the residue in the retort, after distilling water from lobelia seeds, possessed some acrimony; and consideration suggested the idea, that as the active principle was in that case combined with an acid, its presence might exert an influence in preserving the lobelina from decomposition. In

accordance with this view, the following experiment was executed:

Two drachms of bruised lobelia seeds were macerated in two ounces of water, to which five drops of sulphuric acid were added for three days, and filtered. This liquor which had a light brown color, and acrid taste, was divided into two equal portions A and B. A was put into a retort, to which a receiver was adapted, and heat applied until three-fifths of the liquid had distilled. On examination of the product and residue, the former had the odour of lobelia but was tasteless, the latter in the retort was much more acrid than the original infusion, having really *all* the acrimony of the quantity subjected to distillation.

The infusion, B, was saturated with magnesia, filtered and distilled as before, until three-fifths had passed over. The product resembled that of A. On examining the residue in the retort it was found to have *entirely lost its acrimony.*

To ascertain if lobelina itself, when freed from those substances that necessarily accompany it in an infusion, was similarly affected by heat, one and a half grains of lobelina was dissolved in an ounce and a half of water, and divided into two equal portions, No. 1 and No. 2. No. 1 was subjected to distillation in a distillatory apparatus until one-third of the liquid had passed over. The product and residue were re removed and placed in separate bottles. To No. 2 a small portion of sulphuric acid was added, rather more than sufficient to saturate the lobelina, and afterwards subjected to a similar distillatory process, and the residue and product also separately bottled. On examining the results of the distillation of No. 1, the distilled water had a lactescent appearance, which, by standing, assumed a brown color, and had a bitter taste, but not the slightest acrimony. The residue was opaque, had a brick red color, and *none* of the peculiar taste of lobelina, but merely a bitterness. The opacity of the solution No. 1, took place soon after the application of the heat to it.

The product of No. 2 was perfectly *transparent*, and had very little odor or taste. The residue was nearly transpa-

rent and more acrid than the original solution before distillation. It may be well to remark that the lobelina used in this experiment was not entirely pure, owing to the presence of some colouring matter to which the color of No. 1 residue may be attributed.

It follows from these remarks :

1st. That an acrid infusion of lobelia may be raised to the boiling temperature without losing its acrimony.

2d. That the condition necessary to bring about this permanence is the presence of an acid, with which the acrid principle will combine.

3d. That the acrid principle in a free state is decomposed by the heat of boiling water, as it is found in neither the residue or the product when a solution of it is distilled.

Lobelina. Twelve ounces of the seed of *Lobelia inflata*, finely bruised, was macerated in twenty-four fluid ounces of alcohol 28° B., acidulated with half an ounce of acetic acid for three days, and subjected to displacement. This process was continued with dilute alcohol until the seeds were exhausted of their acrimony.

The tincture, amounting to five pints, was evaporated to the consistence of an extract, which weighed an ounce and a half or one-eighth of the seeds employed. This extract was triturated with an excess of magnesia, and twelve ounces of water, gradually added. After frequent agitation for several hours, the liquid was filtered, and the filter washed with water. This solution was then agitated with six ounces of sulphuric ether until all its acrimony was removed. The ethereal solution was then decanted and allowed to evaporate spontaneously in a porcelain capsule. 18.5 grs. (.0035 per cent.) of a reddish brown matter of the consistence of honey resulted, which instantly restored the blue color of litmus, reddened by an acid, and possessed an extremely acrid, burning taste.

In this state lobelina contains coloring matter; to deprive it of which it was dissolved in water, and dilute sulphuric acid gradually added until the solution was slightly acid. It was

then mixed with purified animal charcoal, boiled, saturated with magnesia, and filtered. This solution was then agitated with ether until the lobelina was removed, and the ethereal solution separated and allowed to evaporate.

As thus obtained, lobelina has a light yellow color, and somewhat aromatic odor. It is lighter than water,* and when dropped into that fluid rises to its surface, spreads out like a drop of oil, and gradually dissolves without agitation, forming a transparent solution. If the process of purification were repeated, there is little doubt but that the lobelina would be obtained perfectly colorless.

Lobelina, in solution, is precipitated instantly as a white bitannate by tannic acid, and is not disturbed at all by gallic acid, corresponding in this particular with the other vegetable alkalies. Its solution forms a white precipitate with nitrate of silver, which becomes deep brown by standing; persulphate of iron does not at first affect the transparency of its solution, but gradually a brown precipitate falls; acetate of lead causes a white precipitate; bichloride of mercury does not produce any change.

When lobelina is placed in contact with concentrated nitric or hydrochloric acids, it is merely dissolved, without undergoing any change, and when diluted the acrimony is found unimpaired; but when acted on by sulphuric acid it is first blackened, then dissolved, and loses its acrid taste.

Lobelina is soluble in water, but not near as readily as in alcohol and ether. When its alcoholic solution is poured into water the mixture is at first cloudy, but by agitation it gradually becomes transparent. Ether readily removes lobelina from its aqueous solution. Oil of turpentine, and oil of sweet almonds, also hold it in solution when allowed to remain in contact with it for a short time.

Salts of lobelina.—A portion of lobelina was dissolved in water, and hydrochloric acid gradually added, until the solution ceased to have an alkaline reaction. The solution was

* Lobelina was formerly stated to be rather heavier than water, which was owing to the impure state in which it was obtained.

then allowed to evaporate spontaneously, and the *hydrochlorate of lobelina* obtained in four-sided prisms, terminated by pyramids.

The sulphate was obtained in a similar manner by employing sulphuric acid. It crystallizes in acicular crystals radiating from centres, but they were too small to admit of their shape being distinguished correctly.

The *nitrate* also crystallizes in prisms of irregular shape.

The *oxalate* crystallizes in minute silky needles.

The *lobeliate* of lobelina was also obtained in a crystalline form, but the difficulty of isolating the acid in a perfectly pure state prevented the salt from exhibiting perfect crystallization.

The salts of lobelina are more soluble in water than the alkaloid itself. They are also soluble in alcohol and less so in ether. They do not possess any odor, but, when tasted, exhibit all the acrimony of the base.

To ascertain if lobelina was really the *active principle*, one-fourth of a grain of that substance in solution was administered to a cat. In less than two minutes it produced violent emesis and much prostration, from which the animal fully recovered in three hours.

Again, one grain of lobelina in one fluid ounce of water was administered directly into the stomach of the animal by an elastic tube. Immediate and total prostration was the consequence, which for half an hour rendered the animal almost motionless—the pupils of the eyes were much dilated. The animal gradually recovered its strength, but the effects of the prostration were evident for fifteen hours afterwards. No emetic or cathartic effects resulted, and the long continued narcotic action of the substance may be attributed to its remaining in the stomach.' Other symptoms of narcotic action were evident, which it is unnecessary to mention. From these remarks it is evident that lobelina is *not* so active an agent as nicotine.

ART. III.—ON JUNIPERUS SABINA. By CALEB H. NEEDLES.

(*An Inaugural Essay.*)

Juniperus Sabina, U. S.—The savine plant has been made officinal in most of the Pharmacopœias, its medicinal virtues have been long known, and yet it is an article very little used.

BOTANICAL HISTORY.

The *Juniperus sabina* belongs to the class DIŒCIA, Order MONODELPHIA, L., and to the Natural Family CONIFERÆ of Jussieu.

SPECIFIC DESCRIPTION.

This shrub seldom rises above three feet in height. The flowers, which are male and female, grow on different plants. The male catkin consists of three opposite flowers arranged in a triple row, and a *tenth* flower at the end. At the base of each flower is a broad scale fixed laterally to a columnar pedicle. There are filaments in the terminal flower only, tapering and united at the base, with simple anthers, which are sessile in the lateral flowers. The calyx in the female flowers is 3 permanent scales; the petals are stiff, sharp, and also permanent, and the germen supports three styles with simple stigmas.—The fruit consists of a blackish purple colored berry: it is marked with tubercles which are the remains of the calyx and petals. These berries, upon examination, are found to contain three small hard seeds; they have an unpleasant smell with a hot and bitter taste.

OBSERVATIONS AND GENERAL HISTORY.

Loudon, in his Encyclopædia, gives a detail of this plant. According to his account, the word juniperus was derived from the Celtic, jenoperus, signifying rough, and rude, which

is, indeed, characteristic of the plant. The word sabina originated from the nation of Sabines, whose priests used it in their ceremonies. The different species comprize a numerous list. They are (with one or two exceptions) close, conical, evergreen shrubs or trees. In our garden, the *Juniperus sabina* seldom produces flowers or seeds. Professor Pallas says, that in the Chirsonesus Yaurica, where it is common, the savine is often found one and a half feet in diameter; that it there grows upright, similar to the cypress tree ; whereas, by the Yanais it is procumbent, the branches extending on the sand several fathoms. The wood very much resembles that of the *Juniperus lycia*, (another species,) but has a more cadaverous smell, and the leaves are more fœtid. The leaves and tops of savine have a strong, heavy, disagreeable odor, and a hot bitter taste, with a considerable degree of acrimony. These qualities depend on a volatile oil. The plant flowers in May or June.

HABITAT.

This plant is a native of the south of Europe and the Levant. It has been introduced into this country, and may be found growing in some of our gardens ; being of a hardy nature, it seems well adapted to a sandy and barren soil.

The leaves and ends of the branches are the portion used in medicine. When fresh they are of a dark green color, numerous, small, erect, pointed, glandular in the middle, and completely invest the younger branches. They are collected in the spring for medical use. As found in the shops they present a faded appearance. The *Juniperus Virginia*, or red cedar, is frequently substituted for the savine ; in appearance they resemble each other, but may be distinguished by taste and smell. It possesses properties closely analogous to those of the common pine, though much more active in its operation.

MEDICAL PROPERTIES AND USES.

Savine is highly stimulant, increasing most of the secretions.

It is more generally used in Europe than in our country, and we find instances mentioned of its efficacy in amenorrhœa; the form of administering it was that of powder, in doses of from a scruple to a drachm. It also possesses anthelmintic virtues, and is used as such by the country people in the form of a tea. It is regarded by our physicians generally as a dangerous remedy, and is now but little used; which may, in part, be attributed to the criminal purpose to which it is applied. Dr. Woodville informs us "that its great power in opening uterine obstructions has led to uses the most infamous and unnatural." An ointment, prepared from the stems and leaves, is officinal in our Pharmacopœia, and has been found very useful as an application to blistered surfaces in order to keep up a constant discharge.

CHEMICAL HISTORY.

So far as I have been able to ascertain, no chemical analysis has been made of the plant under consideration. The works consulted for information were, for the most part, brief, and but little knowledge could be obtained as regards its history and constitution. With the hope of being able to throw some light upon the chemical constitution of *Juniperus sabina,* I have been induced to make the following experiments. The plant was collected in the fall, and used in the fresh state.

Experiment 1.—A decoction was prepared by boiling an ounce of the leaves in a pint of water for ten minutes. It was of a pale, straw color, having the peculiar odor of the plant, with a pungent acrid taste. To a portion of this decoction a small quantity of tincture of iodine was added: but there was no indication of starch being present; a solution of subacetate of lead with another portion occasioned a flocculent precipitate of a dirty white color. The muriatic tincture of iron produced a black color with the remainder, proving the presence of tannin.

Experiment 2.—A tincture was prepared by digesting one ounce of the fresh leaves in a pint of alcohol 35° Baumé, for

seven days. At the expiration of that time, the menstruum had acquired a beautiful green hue, and possessed, in a high degree, the properties of the plant. It was filtered and a portion evaporated to the consistence of an extract which consisted of two distinct substances, of which, one was yellow, oily or unctuous, bitterish, and pungent. The other, black, resinous, slightly astringent. This was treated with sulphuric ether, which took up the coloring matter, (chlorophylle,) leaving the resinous portion undissolved. Alcohol dissolved this, and, upon a second evaporation, yielded a yellowish colored extract, excessively bitter and astringent to the taste, resinous to the touch, sticking with tenacity to the fingers. Water, when added to the tincture, gave it a milky appearance, owing to the separation of resin. Corrosive sublimate gave no indication of the presence of albumen.

Experiment 3.—An ethereal tincture was made by mace rating half an ounce of the leaves in two ounces of sulphuric ether for seven days. The solution, when filtered, was clear, and of a beautiful green color. It possessed the pungent taste of the plant, with little of its odor : on evaporation it yielded a small portion of fixed oil of a light green color, having a warm, bitter taste, with the odor of the plant. The ethereal extract was of a dark yellow color, consisting of resinous, oily, and coloring matters.

Experiment 4.—One ounce of the leaves was submitted to distillation with six ounces of water. During the process the odor was increased, and the liquid in the retort acquired a dirty white color. The quantity of leaves mentioned yielded more than half a drachm of pure oil. It was nearly white, limpid, possessing a very strong odor and pungent taste; analyzed by Dumas, oil of savine was found to be a compound of 10 atoms carbon, 7.5, and 8 atoms hydrogen, 1.0.

Experiment 5.—One hundred and fifty grains of the leaves were incinerated, leaving in the crucible twenty grains of grayish colored ashes. These were lixiviated with boiling water and filtered, a small portion of nitric acid was added to the

solution, and it was then evaporated, leaving a crystalline salt possessing the properties of nitrate of potassa.

Experiment 6.—Another portion of the leaves was incinerated and lixiviated with dilute nitric acid, filtered, and the solution tested with oxalate of ammonia. This produced a copious white precipitate, indicating the presence of lime among the constituents.

Experiment 7.—An ointment of the fresh leaves was prepared according to the directions given by the Dublin College, viz.: Adeps eight ounces, Fol. Sabinæ two ounces, Cera Flav. two ounces. When finished it was of an olive color; on exposure and long standing the color becomes much lighter. A cerate made, according to the U. S. Pharm., by rubbing half an ounce of the powdered leaves with three ounces of resin cerate, presented a dark olive color, with a tinge of green.—The two different forms of preparation are essentially the same, and most probably virtually so. The red cedar is often substituted for the savine in making the ointment. The difference can be detected by appearances. To prove this, I prepared an ointment from the red cedar leaves (fresh) in precisely the same proportions as directed for making the Ungt. Sabinæ. This presented a dirty appearance, and was devoid of smell; whereas, that from savine possessed the odor of the plant in a high degree. Doctor Wood's authority may be quoted, wherein he says, "That the red cedar ointment is less efficient than the savine."

Summary.—From the foregoing experiments, I am led to believe that the following principles enter into the constitution of the leaves of the *Juniperus sabina.* To wit: First, gum; second, tannin; third, resin; fourth, chlorophylle; fifth, fixed oil; sixth, volatile oil; seventh, salts of potassa; eighth, lime and bitter extractive.

ART. IV.—CONCRETE OIL OF COCOA. By Augustine Duhamel.

In the belief that some details respecting this substance, now becoming better known, and more employed in this country, may not be uninteresting to some of the readers of this Journal, the following notice of its origin and character is submitted.

The oil or butter, so called from its well known French name *Beurre de Cacao,* is obtained from the seeds of the *Theobroma cacao, T. bicolor,* and other varieties, but principally from the first, which grows from twelve to twenty feet in height in South America and the West Indies.

This tree belongs to the *Polyadelphia pentandria* of Linnæus, and family of *Byttneriacèæ.* The entire fruit is in the form of a cucumber; it is divided internally into five cells, which are filled with a yellowish sub-acid pulp, in the middle of which are scattered about 30 seeds having the form of almonds, but the interior of which is brown, and divided into irregular lobes, which are separated by small white membranes. These seeds are taken out after pounding the fruit and allowing it to ferment for some time. They are afterwards dried, or previously buried in the earth, for several weeks, to deprive them of their acridity.

The chief sources from which commerce is supplied are Caraccas, Guatimala, St. Domingo, and Martinique. The first step towards the extraction from the seeds of its concrete oil, is the process of torrefaction executed in a sheet iron cylinder, the object of which is to destroy the mucilage which attaches the almond to its enevelope. When the torrefaction is complete, which is known by the discontinuance of a crackling noise, the seeds are placed so as to be acted upon by a wooden roller, which breaks the then friable thin covering.

The cocoa seeds are then separated from the husks, and reduced to powder by rubbing them forcibly over a wire sieve

having large meshes, then winnowed and passed through a mill. The next step is to reduce the whole to a paste by pounding in a heated iron mortar, to be afterwards placed in a heated water bath, with a proportion of water equal to one-tenth of the weight of cocoa employed. The heat is continued for a few minutes, and the mass then introduced into a ticking bag, and submitted to rapid pressure between two plates of tin or cast iron, previously heated in boiling water. The oil passes through the meshes of the cloth, and is collected in vessels kept ready for this purpose.

By this method a pound of cocoa is made to yield from four to six ounces of concrete oil. In this condition, however, it is not sufficiently pure, and is required to undergo purification.

To separate it from extraneous matters, it should be melted and transferred to a paper filter, placing the funnel which supports it in a stove, or heated water bath. The filtered product is then received in bottles, which should be well filled, closed, and kept in a cool place.

As thus prepared, cocoa butter is a soft unctuous solid, of white or yellowish-white color, peculiar agreeable odor and a bland pleasant taste. As brought to this country, it is often exhibited in the form of small oblong tablettes, enclosed in tin foil, but if not well preserved from the action of the air, they soon acquire rancidity, when they are no longer fit for medicinal use, as they impart an effect directly contrary to that intended.

It is often found adulterated with suet, which permits it to be sold at a low price. This fraud, to those unaccustomed to the appearance of the *Beurre de Cacao*, is difficult to recognise, and the only method so far known is to test its degree of fusibility.

Pure butter of cocoa melts at 76° F. and congeals at 60° F. When suet is added, the point of fusion varies considerably. Butter of cocoa is officinal in the French Codex. It is valued in medicine principally for its qualities as an emollient, being in great esteem as an outward application to hemorrhoidal tumours and chapped *papilæ*. It is likewise employed in the

French hospitals, internally, in certain conditions of the pulmonary and urinary organs. A few forms in which it is prescribed are subjoined.

℞—Butter of Cocoa,	℥ij.
Syrup of Tolu, } " " Capillaire, }	*aa* ℥j.
White Sugar,	℥ss.

To be given internally by the tablespoonful.

Suppositories.

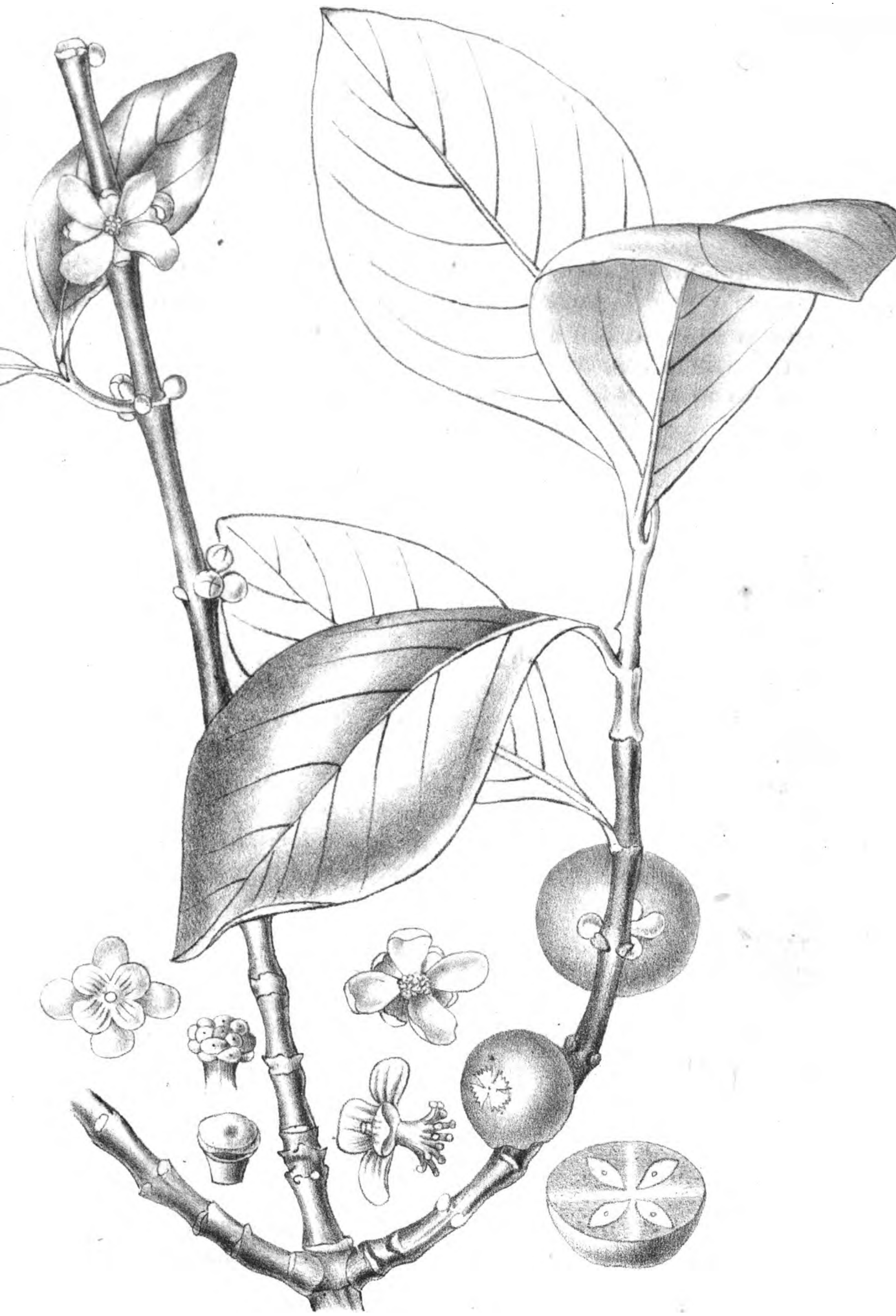
Butter of Cocoa, } Veal Suet, }	*aa* p. e.

Form a conical mass.

Cocoa Cerate for chapped lips and papillæ.

Butter of Cocoa, } White Wax, }	*aa* ℥j.
Oil of Sweet Almonds,	2 oz.

Melt together.



Hebradendron cambogioides.

P. S. Duval, Lith. Phil^a

ART. III.—REMARKS ON THE GAMBOGE TREE OF CEYLON, AND CHARACTER OF HEBRADENDRON, A NEW GENUS OF GUTTIFERÆ, AND THAT TO WHICH THE TREE BELONGS. By ROBERT GRAHAM, M. D., Professor of Botany in the University of Edinburgh. (*With a figure.*)

THERE are, in tropical countries, many plants which yield a yellow juice, so nearly resembling Gamboge in external characters, and, it is said, even in medical properties, that they have each obtained in their respective countries the name of Gamboge Plant. These belong to exceedingly dissimilar families, their products are never exported from the countries in which they grow, and they are therefore known not to yield any part of the *Gamboge* of commerce. It has been much doubted, however, whether this is the produce of one plant only, and those botanists who believe that it is so, differ in opinion as to what that plant is.

Modern naturalists think this substance is obtained from a plant belonging to the natural family of *Guttiferæ;* and they generally differ only in believing, either with Murray, that this plant is *Stalagmitis cambogioides;* or, with De Candolle, that it is *Garcinia Cambogia,* (see *Essai sur les Proprietés Médicales des Plantes,* p. 105.) Murray's opinions were founded upon certain MSS. by König, and the examination of a specimen collected by him, both of which were in the possession of Sir Joseph Banks, by whose liberality he was allowed to publish his observations, which appeared in 1789, in the ninth volume of the *Commentationes Societatis Regiæ Scientiarum Göttingensis.*

The authors of the British and several of the continental pharmacopœias, have adopted Murray's opinions ; but, in a paper read to the Royal Society of Edinburgh, March, 1836, I stated my belief that this acquiescence had been somewhat

too hasty; and my belief was founded on the examination of flowering specimens and drawings, with observations made in Ceylon, most obligingly communicated to me by Mrs. Col. Walker, and on the examination of a specimen in fruit transmitted by Mr. Blair to the late Dr. Duncan, now in the Materia Medica Museum of this University.

All the *Gamboge* of *commerce* is exported, as it appears, from Singapoor, and believed to be obtained from Siam. The observations of König were made in Ceylon, and during a short stay in Siam—but chiefly at the former place, where his specimens must have been gathered; for Murray informs us that all his information in Siam was derived from a Roman Catholic priest, who gave him a very imperfect description of the tree, and that König himself had never seen it alive, and had not even an opportunity of verifying the meagre description (*descriptio proletaria*) of his informant by procuring a single twig. Out of these materials, however,—viz., the said description, the observations of König made in Ceylon, and portions of a specimen in the Banksian Herbarium, transmitted from thence by König,—does Murray construct the character of his genus *Stalagmitis*, and define his species *cambogioides*. Murray's description is, in some respects, wholly at variance with the only tree which, in Ceylon, yields a matter having all the properties, and answering all the purposes of *Gamboge;* yet in Ceylon, as I have said, (I presume from Murray's testimony,) König's specimens must have been obtained. Indeed, we have another authority than that of Murray for this belief; König himself gives his plant the Singhalese names of *Ghokkatu*, *Gokathu*, or *Ghotathu*, and *Kanna Ghoraka;* yet there is nothing so easy as to show that the description of *Stalagmitis* by Murray is inapplicable to this plant.*

* These observations regarding the origin of König's specimens were written before I had the direct testimony of Mr. Brown. In a letter dated Aug. 3, 1836, which I shall presently quote again, he writes, "*Stalagmitis* of Murray, as you well know, is entirely formed from König's MSS., and a portion of his specimens, or rather of one of his specimens; and these specimens, as well as the descriptions, belong to the plant of Celyon."

The specimens which I possess of the Ceylon tree and its product, and the characteristic drawings with which these are accompanied, together with the information I have obtained regarding it, I owe entirely to the great kindness of my most intelligent correspondent, Mrs. Col. Walker; who, conjointly with her husband, is profiting with equal zeal, judgment, and success, by the ample opportunities which they enjoy of cultivating an acquaintance with the botany of that rich and interesting island, Ceylon. It will give value and authority to these observations, if I make some extracts from Mrs. Walker's letters, in which the tree, in conformity with previously received opinion, is called *Stalagmitis cambogioides*,—and I shall afterwards state what the tree really is.

In her first letter, dated Colombo, 1st July, 1833, Mrs. Walker says, "I have set about the *Stalagmitis cambogioides*, which is at present in fruit, and have drawn a branch, with a section of the fruit. I have likewise procured some gamboge from the tree; it is brilliant and excellent. It is obtained from two other trees here, the *Garcinia Cambogia*, and an unknown tree, which Col. Walker thinks is a *Garcinia* likewise. Specimens from both I shall send you, and drawings* also. The fruit of *G. Cambogia* is much used by the natives in their curries; and I am told, when quite ripe is a very fine fruit, as large as the *Mangosteen*, which it resembles in form. The native name is *Goraka*. The fruit of *Stalagmitis cambogioides* is much smaller, very sweet when ripe, and by no means disagreeable in flavor. It is called here *Kana* (or eatable) *Goraka*. I have not yet ascertained all the uses made here of gamboge, but it is certainly employed as a pigment by the native artists. Our servants say it is also used by native practitioners in medicine, and sometimes as a plaster, when first taken from the tree. It does not appear to exude like a gum, but on an incision being made, it issues freely

* I have received excellent drawings of *Garcinia Cambogia*, (Willd.,) of *Garcinia Cambogia*, *β*. (Moon,) and of the unknown plant alluded to, together with specimens of the two first, but none of the last, which seems a species of *Carallia*.—R. G.

through the pores of the bark, as I saw yesterday on cutting both the *Stalagmitis cambogioides* and *Garcinia Cambogia.* I have been trying it as a paint to-day, and find it as good as any I ever used.* We have no intercourse whatever with Siam, and I fear I can procure you no information from thence. I should think, from the specimen I have already got, that the matter which exudes from the *Stalagmitis cambogioides,* when an incision is made in the bark, is undoubtedly pure Gamboge. I have used it in coloring some of my flowers: it is quite liquid when it issues from the pores of the tree, but soon hardens when exposed to the air. I have not tried the stuff from the *Garcinias,* but it tastes and smells exactly like Gamboge."

Mrs. Walker's next letter is dated Aug. 20, 1834:—She says, "Your letter of February, 1833, in which you first mention the subject of Gamboge, I received in June of the same year, and immediately inquired about the plant, which I found to be in fruit. In that state I drew it to the best of my abilities, but put off sending it to you till I had an opportunity of forwarding also a representation of the flower, which, as many plants here blossom twice in the year, I hoped I might not have long to wait for. However, I was mistaken in this; the tree did not blossom till March, 1834. I drew it then, but have not since been able to send it home, not a single ship having sailed from hence to England during that long interval; and, I fear, after all, that you will consider my drawing incomplete, as it is the only barren flower I have had the means of representing. So at least it seems to me, and I got quantities of the blossoms, and examined a great number, and found them all the same. I shall send you specimens for your own examination; but I am sorry to say, they look very shabby and poor. The flower, however, in its best state, is insignificant, and

* In a note on the back of the drawing, Mrs. Walker says, "It issues from an incision in a thickish liquid state, and of a light yellow color, but soon hardens when exposed to the air, and becomes of a much deeper hue, and is perfectly fit for use in water-color drawings, as much so as any I ever purchased, which was prepared and sold in the London color-shops."

poor-looking. The tree does not grow abundantly nor luxuriantly in the immediate neighborhood of Colombo. Last January we took a little excursion, and got quite into a forest of *Stalagmitis cambogioides*, and perceiving all the trees had their bark cut off in various places, I concluded the people in the neighborhood must be in the habit of collecting the gum, and determined to get all the information I could on the subject, for your edification. From a very intelligent native practitioner in medicine, I gained the following :—He told us that Gamboge from the *Stalagmitis*, called by the natives *Gokatu*, or *Kana Goraka*, is generally used by them, both as a pigment and medicinally. For the former purpose it is ground very fine with lime-juice,* and mixed with a pretty strong solution of the gum of *Wood Apple (Feronia Elephantum,)* called in Singhalese, *Diwul.* With the addition of a little Chunam, or Lime, they make a deep orange-color, both tints being much used in the decoration of their temples and Boodh himself is always represented in yellow garments. Yellow is indeed the sacred color, the priests being invariably arrayed in yellow robes.

"As a medicine, the Gamboge is ground to a fine powder, and being mixed with the juice expressed from the leaves of the Tamarind Tree, is taken with a little water. This is the most common mode of administering it as an aperient; but when mixed with other ingredients it is considered by native practitioners to be beneficial in many diseases. It is collected by cutting pieces of the bark completely off, about the size of the palm of the hand, early in the morning. The Gamboge oozes out from the pores of the bark in a semi-liquid state, but soon thickens, and is scraped off by the collectors next morning without injury to the tree, the wounds in the bark readily healing and becoming fit to undergo the operation again. The learned doctor who gave us this information, presented us

* In a recent letter to Dr. Christison, Mrs. Walker says that she finds this to be a mistake. As a yellow pigment, the juice is used without any preparation; the addition of lime juice injuring the color—an observation which Dr. C. has confirmed by experiment.

with a large pot or jar of Gamboge, and promised to send us more, which promise he faithfully kept, and I shall forward specimens to you of his present by the first opportunity. The *Garcinia Cambogia*, of which I transmit you a representation, is one of the most common trees in this neighborhood, attaining a large size, and is very handsome, with remarkable thick and dark foliage. A quantity of resinous juice proceeds from its bark, in the same manner that Gamboge does from the *Stalagmitis;* but it never seems to harden thoroughly, and no use is made of it by the natives. The outer husk of the fruit, however, is a favorite ingredient in their curries. They prepare it by taking out the pulp and seeds, breaking it to pieces, and putting it in a heap, which is covered for two or three days till it becomes soft. It is then smoked by burning cocoa-nut shells below the grating on which it is spread. This operation is continued for many days, when it is tied up tight in a bag, and kept for use by being hung, I cannot say in the chimney, for chimneys they have none,—but where it is under the influence of the smoke from their fires when cooking. They also use it in pickling or preserving, along with salt, a kind of small fish, which cured in this way will keep for six or seven months. The flower of No. 2, which I suppose is also a *Garcinia*, differs much from No. 1, but the fruit appears almost the same, and is used by the natives in the same way. They are indiscriminately called Goraka by the Singhalese, but are distinguished by their color."*

In a subsequent letter, dated January 2, 1835, Mrs. Walker says, "I am convinced *Stalagmitis* produces true *Gamboge* Dr. Pitcairn is of the same opinion, and desires me to tell you that he has administered it in the same way as it is used medicinally at home, and found its effects precisely the same."

I shall now state what the plant seems to be which is called

* No. 1. I believe this to be *Garcinia Cambogia*, Willd., which is *G. affinis* of Wight and Arrnott, certainly not of Wallich. No. 2 is probably a *var.* of *G. Kydia* of Roxb., perhaps his *G. purpurea*; but as Roxb. gives uo description of *G. purpurea*, the point cannot be determined. It is, no doubt, the *G. Cambogia β.*, or Red Garcinia, of Moon's Catalogue. R. G.

by Mrs. Walker *Stalagmitis cambogioides,* and what are my reasons for forming the opinion which I entertain.

Linnæus, in his *Flora Zeylanica,* No. 195, under the name *Cambogia,* quotes as a synonym, "Carcapuli Acostæ, fructu malo aureò simili," of Plukenett's *Almagestum Botanicum;* which, if it be the same as the twig figured by Plukenett in his *Phytographia, t.* 147, *fig.* 3, seems to me to be *Xanthochymus ovalifolius.*

In the same work, Linnæus also quotes, as a synonym of his Cambogia, the "Arbor Indica, quæ gummi guttam fundit, fructu acido sulcato mali magnitudine" of Commelyn's *Flora Malabarica,* which is certainly "Coddam-pulli" of Rheede in *Hortus Malabaricarus, Mangostana Cambogia* of Gærtner, *Garcinia Cambogia* of Desrousseaux and of De Candolle.

Linnæus, lastly, in the same work, cites as a synonym for his *Cambogia* "Carcapuli Acostæ, Arbor Indica gummi guttam fundens, fructu dulci, rotundo, cerasi magnitudine," of Burmann's *Thesaurus Zeylanicus,* which, I think, is certainly *Mangostana Morella* of Gærtner, *Garcinia Morella* of Desrousseaux and De Candolle, and, as certainly, *Stalagmitis cambogioides* of Moon's Catalogue of Ceylon Plants, and of Mrs. Walker; but by no means the "*Carcapuli*" of Acosta in his *Tractado de las Drogas,* p. 356; which seems to be *Carcapuli Acostæ* of *Pluk. Alm.* 81, *Garcinia Cambogia* of Desrousseaux.

It would probably be thought tedious and useless to follow the contradictions of authors regarding the identity of these plants, and that which yields Gamboge, from 1748, when the *Flora Zeylanica* was published, to the present day. I shall therefore pass them all over, until I come to the latest. In the excellent "*Prodromus Floræ Peninsulæ Indiæ Orientalis,*" published by my friends, Dr. Wight and Mr. Arnott, in 1834, it is stated that *Stalagmitis cambogioides* (of Murray) is a species of Garcinia, and perhaps identical with *Garcinia Cochinchinensis* of Choisy, *Oxycarpus Cochinchinensis* of Loureiro. The whole of the account given by Murray

of his *Stalagmitis* appeared to me, at the time I communicated my observations to the Royal Society, so enigmatical, that I felt unable to form an opinion as to what it is; but I expressed my fears that the statement of Wight and Arnott only threw out another temptation to blunder; for Murray says, that in his plant, the flowers are arranged on a common footstalk, generally more than an inch long, in the axils of the leaves, jointed and bearing the pedicels, which are twice the length of the flowers themselves, in verticels at the joints, and that the fruit is globular, white, slightly reddened on one side, and sometimes twice the size of a large cherry; while Loureiro and Choisy describe their plant as having clustered nearly sessile flowers, with a pear-shaped reddish-yellow fruit, two inches in diameter. Wight and Arnott further say, that the *Stalagmitis cambogioides* of Moon is the *Xanthochymus ovalifolius* of Roxburgh; but Roxburgh describes his plant as having a three-celled ovary, a fruit as large as a small apple, while the genus is partly characterized by the flowers having five petals, and by the presence of five large truncated glands, alternating with the fasciculi of stamens. On the other hand, Mrs. Walker's drawings, and specimens of the fruit sent by Mr. Blair to Dr. Duncan, shows that this, like the fruit of *Garcinia Morella*, is four-celled, and not larger than a cherry; and in the specimens which Mrs. Walker has sent to me, I never find more than four petals, and cannot see a trace of these glands. I only mention these circumstances now, to show the inextricable confusion in which the subject lay, and in which it would have remained, had it not been for Mrs. Walker and the kindness with which Mr. Brown attended to my request that he would examine the specimens of König in the Banksian Herbarium. This examination has reconciled most of the contradictions of authors in a way which could hardly have been anticipated; the authoritative specimen of König is a compound, and consists of the flowers of *Xanthochymus ovalifolius*, with what seems the branch, leaves, and fruit of the plant which in Ceylon yields Gamboge. I give authority to this statement by quoting the letter of Mr. Brown. "The

plant sent pasted by König to Sir Joseph Banks, as one specimen, I have ascertained to be made up of two plants, and very probably of two genera. The union was concealed by sealing wax. The portion in flower, and which agrees in structure with Murray's account, is, I have no doubt, the *Xanthochymus ovalifolius* of Roxburgh. *Stalagmitis* and *Xanthochymus* are therefore one genus, as Cambessèdes has already observed, giving the preference to the earlier name of Murray. This, however, forms but a small part of the whole specimen, the larger portion being, I am inclined to think the same with your plant, of which I have seen, and I believe still possesss, the specimen you sent to Don.* The structure, however, of this great portion cannot be ascertained from the few very young flower-buds belonging to it. It approaches also very closely, in its leaves especially, to that specimen in Hermann's Herbarium, which may be considered as the type of Linnæus' *Cambogia Gutta*. A loose fruit, pasted on the sheet with König's plant, probably belong to the larger portion, and resembles Gærtner's *Morella*."

It appears then that the generic name of *Xanthochymus* must be dropped, and that the species which belonged to this genus must receive the appellation of *Stalagmitis*. It seems too, that the generic character of *Stalagmitis* by Murray, so far as regards the flower and the inflorescence, was not taken from the plant he meant to describe, but from the flowers of *Xanthochymus (Stalagmitis) ovalifolius*, which König had inadvertently fastened to it; and lastly, that it is not known that any specimens of the flowers of the plant which Murray meant to describe, at least not any sufficiently perfect for examination, had been received in Europe, till those arrived which I owe to Mrs. Walker. The examination of these, proves that the plant is no *Stalagmitis*. It differs wholly in the number of the parts of the flower and cells of the fruit, in the structure of the calyx, corolla, and stamens; in the absence of intervening glands between the stamens, in the structure of the leaves, in the appearance of the fruit, and in the

* One of those received from Mrs. Walker.

structure of the persistent stigma. While I remain quite certain that this plant is the *Garcinia Morella* of Gærtner, an opinion which was first formed from an inspection of the specimen in fruit from Mr. Blair, the examination of Mrs. Walker's specimens has induced me to remove the plant from the genus *Garcinia*. The structure of the stamens is quite peculiar, and quite unlike that of any species of *Garcinia* with which I am acquainted, in which the free portion of the filament is thread-like, and the anther bilocular, opening longitudinally. In Mrs. Walker's flowers, on the contrary, the free part of the stamens is thick and clavate, and the anthers open by the complete circumcision of a singular umbilicate, flat, and terminal lid, the elliptical pollen-granules being immersed in cellular substance.

For these reasons, I cannot hesitate in believing that the Gamboge plant of Ceylon belongs to a nondescript genus, characterized especially by the stamens, which have suggested the name of *Hebradendron*. Having communicated this opinion to Mr. Brown, he replied, "In your plant, the structure of the anther is indeed very remarkable, and might well induce you to consider it as forming a distinct genus; but it is right to add, that approaches to this structure, and which serve to explain its analogy with the ordinary structure of the family, exist in *Garcinia*, with which I suppose your plant would agree in its female flower, as well as in fruit."

As I have never seen the female flower, nor any drawing of it, I cannot add to the probability which is given to this conjecture by Mr. Brown having formed it, except by stating, that there are within the persistent calyces of the fruit, abortive filiform stamens, very much resembling those which are found similarly attached to the fruit of *Garcinia*.

The resemblance to the Ceylon plant, of the inflorescence and form of the flower-bud, of *Garcinia elliptica* (*Wallich's List*, *No.* 4869,) led me to examine its structure in connexion with this subject, and I found it also to have male blossoms, with stamens precisely similar. Sir W. J. Hooker was also struck with the resemblance, and obligingly forwarded to me

his specimen for examination. His flowers were further advanced than mine, and on my requesting him to steep one, he sent me drawings which it is impossible to distinguish from those taken from the Ceylon plant. It is unfortunate that we do not know the female flowers in either species; and yet, if I do not misunderstand Mrs. Walker, or if she is not mistaken, which is less likely, the Ceylon plant is monæcious.

It is very certain that the tree of Ceylon yields a *Gamboge*, fit for all the purposes of that from Siam, and equal to it in quality, though from the process by which it is prepared for the market not being so perfect, its appearance is less attractive, and the price must be depreciated till that process is improved. At present, however, we have no direct testimony as to the tree which affords the *Gamboge* of Siam. Its being the same with that which in Ceylon yields this substance may be doubted. It is perhaps, and more probably, a nearly allied species of the same genus; this affinity appearing from the experiments of Dr. Christison, showing all but an identity of chemical composition in the product, and from their medicinal effects being precisely the same, as has been proved in Ceylon, and in this country, both by Dr. Christison and myself.

It seems probable, from some parts of the description in the *Flora Indica*, and the quality of the Gamboge yielded by it, that *Garcinia pictoria*, Roxb., may prove to be another species of this genus; but in this conjecture I must be wrong, if Buchanan is correct in considering this the same as *Oxycarpus Indica (Encycl. Method. Suppl.* 4. 257.) I think, however, Buchanan is mistaken, for he deems it, at the same time, synonymous with *Garcinia Indica* of Choisy, and with "Arbor Indica Gummi guttam fundens," &c. of Burmann; while, in fact, the specimen in his Herbarium, from which he makes these references (No. 1118) is *Garcinia cornea*. The locality where *Garcinia pictoria* is found (Wynaad) being limited, and the tree having been, formerly at least, well known at Tellicherry, it is probable that specimens may be procured to ascertain the fact.

HEBRADENDRON.* *Graham.*

Nat. Ord. GUTTIFERÆ.—Class and Ord. MONŒCIA (or Diæcia?) MONADELPHIA.

GEN. CHAR. HEBRADENDRON. *Flores* diclines. *Masc. Calyx* membranaceus 4-sepalus, persistens. *Corolla* 4-petalla. *Stamina* monadelpha, columella 4-gona, antheræ terminales, operculo umbilicato circumscisso. *Fæm.* incognitus. *Bacca* multi (4) locularis, loculis monospermis, staminibus quibusdam abortivis liberis basi circumdata, stigmate sessile lobato muricato coronata. *Cotyledones* crassæ, coadunatæ. *Radicula* centralis, filiformis.—Arbores *foliis integris.*

1. Hebradendron *cambogioides;* floribus masculis axillaribus, fasciculatis ; sepalis junioribus subæqualibus ; foliis obovato-ellipticis, abrupte subacuminatis.

Synonyms.

Carcapuli Linsot, *Herman. Mus. Zeylan. p.* 26. *Ibid.* in *Rheed. Hort. Malab.* 1. 42. *in nota.*—Ray *Hist. Plant.* 2. 1661. *Samuel Dale Pharmacop.* 327.

Arbor Cambodiensis Guttam Gambi fundens. *Pluk. Alm.* 41. *Ibid. Mantissa* 20.

Arbor Indica Gummi guttam fundens, fructu dulci rotundo, Cerasi magnitudine, Carcapuli Acostæ *J. Burmann, Thesaurus Zeylan.* 27.

Cambogia Gutta. *Linn. Fl. Zeylan.* 87. (*excel. omn. syn- præter. Dale, Ray, Burm. Herm.*) *N. L. Burmann. Fl. Indic.* 119. (*excel. Syn. Pluk. et Rheed.*)

Mangostana Morella. *Gært. Fruct.* 2. *p.* 106. *t.* 105.

Garcinia Morella. *Desrousseaux in Lam. Encycl. Method.* 3. 701. *Pers. Synops.* 2. 3. *Choisy in De Cand. Prodr.* 1. 561.

Stalagmitis Cambogioides. *Moon's Cat. of Plants in Ceylon, Part I. p.* 73.

DESCR. A *tree* of moderate size. *Leaves* opposite, petiolate, obovato-elliptical, abruptly subacuminate, coriaceous,

* From ἱβζαιος δενδρον, in allusion to the peculiar dehiscence of the anthers.

smooth, shining, dark-green above, paler below, veins in the recent state inconspicuous, especially above; in the dried state, distinct on both sides. *Flowers* unisexual, monæcious (or diæcious ?) *Male* small (eight to nine lines across,) clustered in the axils of the *Petioles*, on short single-flowered peduncles. *Sepals* four, subequal, imbricated, concave, membranous, veined, the outer subentire, and somewhat coriaceous in the bud, the inner sparingly denticulato-ciliate, yellow on the inside, yellowish-white on the outside. *Petals* four, spathulato-elliptical, coriaceous, crenulate, longer than the calyx, yellowish-white, red on the inside near the base, deciduous. *Stamens* monadelphous; column four-sided; *Anthers* in a roundish capitulum, terminal upon a short clavate free portion of the *filament*, opening by the circumcision of a flat umbilicate lid; *pollen* yellow, granules elliptical. No trace of a *Germen*. *Female Flower* unknown. *Berry* about the size of a cherry, round, with a firm reddish-brown external coat, and sweet pulp, four-locular, surrounded at the base by the persisting *calyx* and a few free abortive *stamens*, crowned with the four-lobed tubercled sessile *Stigma*; loculament single-seeded. *Seeds* large in relation to the berry, reniform-elliptical, compressed laterally, integuments yellowish-brown, easily separable into two layers; *Cotyledons* thick, cohering into an an uniform cellular mass; *radicle* central, filiform, slightly curved.

Native of Ceylon.—For the color and several other parts of the description, I am indebted to Mrs. Walker.

Fig. A. Male flowering branch. Fig. 1. Front view of a flower. 2. Back view of ditto. 3. Side view of the Calyx and column of Stamens. 4. Column of Stamens taken out from a bud. 5. Anther:—all but 4 and 5 *nat. size.*—B. Fruit-bearing branch. Fig. 1. Section of the fruit with its four seeds:—*nat. size.*

2. Hebradendron *ellipticum*; floribus masculis axillaribus, fasciculatis; sepalis exterioribus junioribus minoribus; foliis lanceolato-ellipticis, apice sensim attenuatis.

Synonym.

Garcinia elliptica. *Wall. List of Indian Plants, No.* 4869 (*not Choisy in De Cand.* Prodr. 1. 516.)

I know nothing of this species, but from the specimens sent by Dr. Wallich to Sir W. J. Hooker's Herbarium and to my own. The specific character which I have drawn up, may therefore seem insufficient to distinguish it; and I might perhaps, have considered it only a *variety* of *H. Cambogioides*, but for the complete identity of form in the specimens from Dr. Wallich; their *prima-facie* difference from any of those received from Mrs. Walker; their considerably larger dissimilar leaves, and also their very different geographical position, less unlikely to possess natives of Siam than of Ceylon, Dr. Wallich's plants were obtained in Silhet.

Companion to the Botanical Magazine.

ART. V.—ON THE PERCHLORATE OF THE OXIDE OF ETHULE OR PERCHLORIC ETHER. By Clark Hare and Martin H. Boye.

The energetic properties of perchloric acid, and its stability, compared with the other compounds of chlorine with oxygen, led us to the belief that this acid might be combined with the substance which performs the part of a base in that class of organic salts which are generally designated by the name of *ethers*, and for which Berzelius, in consequence of his theoretical views, has adopted the name of oxide of ethule. For this purpose a concentrated solution of perchlorate and sulphovinate of barytes, in equivalent proportions, was subjected to distillation. The sulphovinate of barytes may be considered as a double sulphate of barytes and the oxide of ethule; and we anticipated that, when heat was applied, a double decomposition would take place between the latter and the perchlorate of barytes. So long as the salts remained in solution no reaction occurred, but as soon as they became solid, in con-

sequence of the distillation of the water, a reciprocal decomposition ensued, and a sweet ethereal liquid distilled into the receiver. This *liquid* is the *perchlorate of the oxide of ethule*.

As this substance is extremely explosive, in order to prepare it with safety it is necessary to operate on small quantities. We have employed from seventy to ninety grains of crystallized sulphovinate of barytes, with an equivalent proportion of perchlorate of barytes;* but we would recommend, especially on first performance of the experiment, the employment of considerably smaller quantities. The salts should be intimately mixed in a mortar, and placed in a small retort attached to a refrigerator containing ice, and a receiver similarly cooled. The retort is to be heated in an oil-bath, in which a thermometer is suspended, so as to indicate the temperature. A wooden screen, furnished with openings, covered with thick plate-glass at such intervals as to afford a full view of the different parts of the apparatus, should be erected in front of it, and strings passed around the screen and attached to a bar traversing on a pivot, and supporting an argand spirit lamp, by which heat is communicated to the oil-bath, so as to enable the flame of the lamp to be removed from or applied to the apparatus, according to the indications of the thermometer, without exposing the person of the operator. After the heat has reached 212° F., below which the salts employed do not react on each other, it should be raised very gradually, and the distillation finished below 340° F. Under these circumstances but little danger is to be apprehended from the retort, but the ether in the receiver must be treated with the greatest caution, since it has exploded in our hands in attempting to remove it with a pipette from the stratum of water which covers it.

* The amount of barytes in the perchlorate should be ascertained by an experiment, as it retains water with great tenacity. It may be worth while to mention, that the perchlorate of potassa cannot be substituted for the perchlorate of barytes, since the sulphovinate is decomposed without acting on it. We were equally unsuccessful in an attempt to procure the ether by the distillation of perchlorate of barytes and concentrated sulphovinic acid.

This water, therefore, should be removed by the cautious use of strips of blotting paper, moistened at the end, and introduced into the tube employed as a receiver.

To avoid the danger attendant on the management of the ether in its pure state, it may be received in strong alcohol, since it is not explosive when dissolved in alcohol. If the experiment be performed with seventy grains of sulphate of barytes, from one to two drachms of absolute alcohol will be found sufficient for this purpose. By the addition of an equal volume of water, the ether may subsequently be separated from this solution, in small quantities, for the purpose of examination. But, in this case a loss of ether is sustained, by the decomposing influence of the water employed.

The perchlorate of ethule obtained in this way is a transparent, colorless liquid, possessing a peculiar, though agreeable smell, and a very sweet taste, which, on subsiding, leaves a biting impression on the tongue, resembling that of the oil of cinnamon. It is heavier than water, through which it rapidly sinks. It explodes by ignition, friction, or percussion, and sometimes without any assignable cause. Its explosive properties may be shown with but little danger, by pouring a small portion of the alcoholic solution into a small porcelain capsule, and adding an equal volume of water. The ether will collect in a drop at the bottom, and may be subsequently separated by pouring off the greater part of the water, and throwing the rest on a moistened filter, supported by a wire. After the water has drained off, the drop of ether remaining at the bottom of the filter may be exploded, either by approaching it to an ignited body, or by the blow of a hammer. We are induced to believe that, in explosive violence, it is not surpassed by any substance known in chemistry. By the explosion of the smallest drop, an open porcelain plate will be broken into fragments, and by that of a larger quantity, be reduced to powder. In consequence of the force with which it projects the minute fragments of any containing vessel in which it explodes, it is necessary that the operator should wear gloves, and a close mask, furnished with thick glass-plates at the aper-

tures for the eyes, and perform his manipulations with the intervention of a moveable wooden screen.*

In common with other ethers, the perchlorate of ethule is insoluble in water, but soluble in alcohol; and its solution in the latter, when sufficiently dilute, burns entirely away without explosion. It may be kept for a length of time unchanged even when in contact with water; but the addition of this fluid when employed to precipitate it from its alcoholic solution, causes it partially to be decomposed. Potassa dissolved in alcohol, and added to the alcoholic solution, produces, immediately, an abundant precipitate of the perchlorate of that base, and, when added in sufficient quantity, decomposes the ether entirely. It would appear, therefore, impracticable to form either perchlorovinates or perchlorovinic acid.

We have subjected the perchlorate of ethule to the heat of boiling water without explosion or ebullition.

It may be observed that this is the first ether formed by the combination of an inorganic acid containing more than three atoms of oxygen with the oxide of ethule, and that the chlorine and oxygen in the whole compound are just sufficient to form chlorohydric acid, water and carbonic oxide with the hydrogen and carbon.

The existence of a compound of the oxide of ethule with an acid containing *seven* atoms of oxygen led us to attempt to combine, by the same method, this base with nitric acid. For this purpose we subjected a mixture of sulphovinate and nitrate of barytes to the same treatment as described above, but the reaction, even when conducted with the greatest possible care, is destructive, hyponitrous ether and gaseous matters being the principal products obtained. Nor were we more successful in our attempt to procure a sulphurous or hyposulphuric ether by the same process.

Transactions of Amer. Philosoph. Society.

* Having sufferred severely on several occasions from the unexpected explosion of this substance, we would earnestly recommend the operator not to neglect the precautions mentioned above.

ART. VI.—MILDEW, OR MELDEW.

After reading an essay in the last number of the Cabinet, headed "Blight on Wheat," I was induced to read what numerous authors had written on the subject of mildew, rust, and blight; but on reflection, in regard to the *terms*, it was thought best to expunge the latter, as too general and indefinite to be applied to a specific form of disease, the character of which is well known to farmers, though the *cause* is not well understood. We say, familiarly, that any species of grain, fruit, &c., that fails in arriving at perfection, is *blighted*, without any reference to the form, character or cause of the disease or accident, which has given rise to the failure.

The term *mildew*, or *meldew*, which I suspect was the original word, is formed of the word *mel*, which means honey, and *dew*, which needs no explanation; the combined term being, in plain English, *honeydew*, which, no doubt, took its designation from a sweet substance found on the surface of the wheat after it became diseased, and which is now believed to be the excrement of very small insects, which attack the plant after the hand of death has come upon it, and decomposition has commenced. The term *rust* needs no explanation to the farmer who has once suffered by this form of disease in his grain crop. These two terms indicate forms of disease, both of which, it is believed, proceed from one common cause, and are only slight modifications of the same disastrous malady.

Some of the authors which have been examined, ascribe the disease to great heat, some to hoar frost or cold after great heat, electricity, diseased seed, disease of the root of the plants, the presence of the barberry bush, fungi, insects, wind from particular quarters, and various other causes, all equally unsatisfactory.

It is pleasant and satisfactory to be able to trace the diseases,

both of animals and vegetables, to their true cause, even if we should not be enabled to prescribe a remedy for them; and upon reflection in regard to the various circumstances connected with the mildew in grain-crops, some thoughts have arisen and have matured into opinions, which I will throw into the common stock, that farmers may judge of them, and see how far they agree with their own experience and observation.

The conditions under which it is believed that wheat arrives at the greatest perfection are, a cool season and a reasonably dry atmosphere at the time of the filling and maturation of the grain; it being assumed that the soil is sufficiently moist to furnish the requisite nutriment for a healthy state of the plants.

The summer of 1816 was of this description, and the wheat of that year was of extraordinary weight and fineness; and what was then considered of equal importance, the crop, when brought to market, sold for three dollars per bushel of 60 lbs., a price it has never since commanded. A worthy farmer, residing in Montgomery county, had that season an average of 32 bushels and 8 lbs. per acre for his whole crop, and sold it for 3 dollars per bushel, being a little more than 96 dollars per acre, and the farm on which it grew cost him 24 dollars per acre some twenty years previous.

The circumstances, which are supposed to be always present in a greater or less degree when the crop becomes diseased with *mildew*, are the following, viz.: The atmosphere saturated with moisture, in the form of fog or otherwise, a high temperature of the air, and scarcely a breath of wind stirring, the latter being a necessary consequence of the former conditions, because, if the wind was active, the moisture would be dissipated and the heat rendered less sensible. In fact, such weather as is familiarly known by the term hot and muggy, and which sometimes relaxes the human system to that degree that it seems as if it was on the point of dissolving; the reason being, that the air is so saturated with moisture that it refuses to take up the insensible perspiration from the surface of the human body, and the heat, which would necessarily go

along with it, remains pent up within us, without a possibility of escape, to our great suffering and discomfort.

There are other conditions of the crop, which render the above circumstances more certainly fatal, but it is doubted whether *alone* they would be much detrimental in producing mildew—such as a very succulent, vigorous growth, produced by manuring too highly, &c.

Now for the *theory;* the word I don't like much, because farmers in general complain so much about theories; but have them we must, while men continue to *think;* for if we think about facts, we are constantly forming theories, in spite of our wishes to the contrary; but theories are only bad or wrong when they don't explain facts, and of this every man must judge for himself. If theories are true and give sound reasons for things, they are good theories, if not, they are bad, and should be discarded without ceremony.

All plants derive their nutriment from the earth, and take it up in a state of very dilute solution in water; this is elaborated in their organs, in a way incomprehensible to us, and deposited where it is needed, to promote the growth and expansion of the plant, and enable it to perform the functions designed in its creation; and the great object would seem to be, to cause it to perfect its seed and continue its species. When this deposit of nutriment is made, the water, which was its vehicle of conveyance, is thrown out of the plant as excrementitious by proper exhaling vessels, and is dispersed in the form of vapor, in the atmosphere, and the vessels of circulation, which are in continual action, introduce continued supplies of similar nutriment duly prepared for deposit, and throw off the water as before, so that there is never a vacuum in the plant.

This process is in continual action till the plant is perfected, and the quantity of water thrown off during the progress of vegetation is almost incredible, as would appear by some very accurate experiments made to indicate the amount. Of 15 parts of water taken up by some plants, 13 are transpired, and of the lowest on the scale, of 5 parts taken up 4 are discharged by exhaling vessels.

Wheat and other plants, when they have acquired their full growth, commence the interesting business of perfecting their seeds, in order to perpetuate their kind; and then nature brings all her powers into requisition to effect this remarkable process. The vessels of the plant are distended with the proper fluid making its way to the seed-vessel, which has been duly prepared to receive it, which is there deposited in the form of a milky juice, when the water, which has been the vehicle for its conveyance, is discharged through exhaling vessels into the atmosphere, and another supply from the same source is constantly in the rear, to be disposed of in a similar manner; and so the process goes on—provided there is no unfortunate interruption from external causes—till each grain is filled with farina, when, the great work being completed, the circulation ceases to be carried on, and the whole is dried and hardened for preservation.

When this process is going forward, it will be perceived that a vast proportional quantity of water must be constantly discharged into the atmosphere, otherwise, space would not exist in the hull of the grain for additional supplies of the diluted nutriment, which is continually arriving at its destined depository; but should the atmosphere at this critical period unfortunately be *saturated* or *surcharged* with *moisture*, as has been before hinted, it will be unable to take up and carry away that which the grain must necessarily part with, and which is now an incumbrance to it, in order to make room for an additional supply of the fluid which would increase the deposit of farina. This inability of the air to take up an additional load of moisture, under the circumstances of its previous *saturation*, prevents it also from carrying off the heat from the wheat, so that the temperature of the whole plant is increased much above the proper standard of its healthy action; for the temperature of plants that transpire moisture freely is constantly kept many degrees cooler than the surrounding atmosphere, or bodies destitute of vital action. This retention of excrementitious moisture suspends the circulation, for it can't move unless it can get vent, and that and the

expansion occasioned by increase of temperature producee con gestion, and burst the vessels of circulation, and discharge their contents into the cellular texture, destroy the vitality of the plant, and leave the hull only partially filled with farina. Heat, air and moisture, the agents of putrefaction, being present, decomposition begins, and the surface of the plant soon displays signs of decay. This destructive process first shows itself in the smallest part of the stalk, near the head, which is of most recent formation, and consequently most succulent and tender, and most liable to rupture. The rust is probably occasioned by the heat and internal pressure enlarging the pores of exhalation and discharging the sap on to the surface of the stalk, and when evaporation carries off the moisture, the residuum displays itself somewhat like the rust of iron. After the rupture and discharge of the sap-vessels, the surface of the plant is covered with mucous which is adhesive, and this will account for the seeds of fungi, which are supposed to be floating in abundance in the atmosphere, taking root and vegetating in the decaying structure; and hence the supposition, that fungi are the *cause of mildew.*

The presence of animalcula may be accounted for on the same principle, for nature is ever economical, and wherever animal or vegetable substances are in the progress of decay, mouths are found ever ready to convert dead matter into food for living things, so as to perpetuate the largest possible amount of animated existence. On the death of the plant, the tender succulent fibres of the roots immediately decay, and on drawing them from the ground, the appearance of them has led many to suppose that they had thus discovered the true *cause* of the disease of the plant, when, in fact, it was only the *effect* of its previous dissolution.

It may be objected that if the mildew is the result of a general saturation of the atmosphere with moisture at a particular period, that all wheat should be equally injured by it; when the fact is well known, that of contiguous fields one will be destroyed and the other remain uninjured. This apparent contradiction is accounted for by the uninjured wheat

being more forward in filling than the other, for the whole mischief takes place in a few days, perhaps a few hours ; and where the grain has received the requisite supply of nutriment the circulation is diminished or suspended, and there is no danger of injury from the canals breaking their banks and overflowing.

The grain in the same inclosure is often partially injured ; in low and damp spots, or where it is lodged, for want of the requisite circulation of the air to dissipate the moisture, the injury is great from mildew; when in the higher and drier parts of the same field, it is protected from injury, by a freer circulation preventing the mischief by carrying off the excess of moisture and promoting a healthy transpiration from the plants.

The elasticity of plants favors their being put in motion by the wind, and this no doubt increases the circulation of the sap, in the same way that motion in animals promotes the circulation of the blood ; and, at the same time it favors the evaporation of moisture and promotes a healthy condition. On this principle, it is supposed that good may arise from passing a rope extended across the ridges of wheat in such a manner as to communicate motion to the stalks, and in some measure dissipate the excess of moisture on the principle of *fanning*, as has been recommended by some writers on the subject of mildew. But perhaps the most effectual plan of guarding against this fatal disease would be to seek for and sow only the earliest varieties of wheat, which fill before the season arrives most likely to be accompanied by that condition which is the cause of injury.—AGRICOLA.

Farmer's Cabinet.

ART. VII.—EXPERIMENTS APPLICABLE TO THE STUDY OF ALCOHOL, SPIRIT OF WOOD, AND ETHERS. By M. KUHLMAN.

In this account, my aim has not been to examine the speculations relative to the chemical constitution of the ethers, but to amplify those facts which would appear to lead us to place so important a portion of our theories upon some immoveable basis.

I have, therefore, given to all my experiments a special tendency towards a fixed system, and, in my equations, I have used the crude formulæ of $C^4H^{12}O^2$ and $C^2H^8O^2$, to designate alcohol and spirit of wood.

1. I have divided my essay into five parts. In the first, I take a general view of the compounds which alcohol and ether form with bodies attractive of water. Having indicated the circumstances under which alcohol and ether play the parts of water of crystallization, I am thence led to attribute to these bodies the characters of acids or of bases, whenever they enter into combinations possessing the character of saline matter. It is not without some degree of hesitation that I admit the existence of alcoholic compounds, in which alcohol plays the part of a base. Prepossessed with ideas concerning the composition of alcohol, which have a tendency to consider it as a hydrate of ether, I have been led to view the combinations of alcohol as combinations of ether and water. There is nothing to oppose this opinion, but there is also nothing to favor it strongly; and certainly, on examining the question without prepossession, we may admit, without difficulty, the existence of alcoholic compounds, however little stability they may possess under some circumstances. These questions, however, I leave to the authors of the different theories of etherification.

I have thought it necessary to admit the existence of alcoholic

compounds, because I have been able to distinguish them from another equally numerous series of compounds, which I have obtained by the direct combination of ether with substances attractive of water, and of which the properties differ essentially from those of the alcoholic compounds. Thus, while by the action of water my alcoholic compounds always yield alcohol, my ethereal compounds always afford ether, while some alcoholic compounds alter by heat, producing ether, oil, &c., the corresponding ethereal compounds volatilise without change; of this number are the compounds formed with perchloride of tin. Other alcoholic compounds are voporizable without alteration, and do not change into ethereal compounds but under the influence of a temperature of about 140°; such is the combination of alcohol with the fluoride of boron.

What I have said of alcohol as to the combinations into which it enters, is equally applicable to the spirit of wood.

I have made manifest that the part of a base does not appertain to alcohol, ether, and spirit of wood, but also to the ethers of the hydracids under similar circumstances; and have also made known the results of some experiments upon this species of compound.

2. In the second part of my essay, I have examined the action of heat upon the alcoholic and methylic compounds; first, those where alcohol and spirit of wood act as acids; and after where these bodies form the electro-positive elements of the compound.

The combinations of powerful bases with alcohol or spirit of wood, do not give rise to ether by the action of heat; their decomposition takes place at a temperature but slightly elevated, and those portions of alcohol or spirit of wood which are retained, are not decomposed but at a temperature of about 250°, and yield gaseous hydro-carburets, and under some circumstances an empyreumatic oil.

The combinations of alcohol and certain metallic chlorides always yield ether at the temperature of about 140°, when the combination is submitted to heat in presence of an excess of alcohol; the ether thus disengaged is always in part sulphu-

ric ether. When we operate with an excess of the chloride, hydrochloric ether is the sole product, and may then be obtained at the temperature of 85° or 90°. The ether is not always disengaged in a free state; for on operating with the volatile chlorides, it is frequently obtained, and especially towards the end of the distillations, in combination with these chlorides.

By distilling a mixture of 100 parts of perchloride of tin with 53.79 parts of absolute alcohol, or 2 atoms perchloride to 3 atoms alcohol, the largest proportion of ether is obtained.

The most suitable proportion of perchloride of iron is, 100 perchloride and 57.82 absolute alcohol, or 1 atom perchloride to 2 atoms alcohol. When a larger amount of alcohol than above indicated is used, the excess distils over previous to the formation of ether.

The presence of some water may render a modification of these proportions necessary, but will not prevent etherification from taking place.

Mixtures of absolute alcohol and perchloride of tin or anhydrous perchloride of iron, made in the proportions represented by the formulæ, $2SnCl^4, 3C^4H^{12}O^2$ and $Fe^2Cl^6, 2C^{14}H^{12}O^2$, may be preserved several days in vacuo without loss and without change.

The formation of ethereal compounds takes place under ordinary circumstances, corresponding to those which accompany the formation of alcoholic compounds. On mixing 100 parts of perchloride of tin with 57.88 parts of absolute ether, or 1 atom perchloride and 2 of ether, and placing this mixture in vacuo at common temperatures, an excess of free ether volatilises, amounting to one-fourth of the quantity used, so that there remains a compound having the formula $2Sn^4 3C^4H^{10}O$. When this product is heated in vacuo to 40° or 50°, it distills and condenses in the neck of the retort, in the state of fine brilliant crystals, under the form of rhomboidal tables.

Etherification has been produced by the action of heat on the alcoholic compounds of perchloride of antimony, chloride of zinc, and chloride of aluminium. The last yields hydrochloric

ether only. The chloride of arsenic does not yield ether. By the action of heat the compounds of fluoride of boron yield at 140° an ethereal compound which distils over; before reaching 140°, a part of the alcohol vaporises without alteration. The product in the retort in succession is changed into an ethereal compound, yielding ether by mixture with water. Operating with perchloride of tin, the residue in the retort, after the disengagement of part of the ether, yields alcohol constantly by contact with water. This difference may be attributed to the great volatility of the ethereal compound of the perchloride of tin, on which account it escapes in vapor as soon as formed, which does not happen with the compound of ether and fluoride of boron, this vaporising only at 140°. The fluoride of silicon does not convert alcohol into ether.

3. After the etherification of alcohol by the metallic chlorides and fluorides, I examined the action of agents upon the spirit of wood at an elevated temperature. I have already stated that spirit of wood forms alcoholic compounds. The action of heat upon those compounds where the spirit of wood plays the electro-positive part, presents great analogy with that which it exercises on the alcoholic compounds. When, in a mixture of spirit of wood and etherifying chloride, the spirit of wood predominates, it forms, as in alcohol, two species of ether : one a peculiar methylic ether, which condenses at 0° and remains liquid at ordinary temperatures, and a methyl-hydrochloric ether which condenses only at very low temperatures. When the chlorides are in great excess, the latter ether only is produced. The temperatures at which etherification of spirit of wood takes place are generally less elevated than those suitable for alcohol. They are generally from 125° to 150°. The proportion most favorable to produce etherification by perchloride of tin appears to be 2 atoms spirit and 1 perchloride. The reaction of etherifying chlorides upon spirit of wood presents this remarkable difference with that produced with alcohol, that the mixture with spirit of wood always becomes reddish-brown, and on the addition of water deposits a resinous matter, which does not happen with

alcohol ; finally the residue of the distillation always contains a resinous matter or carbon, and the chlorides are reduced to proto-chlorides.

The fluoride of boron changes spirit of wood into common methylic ether, difficult to condense. This ether is never disengaged in an isolated state, but always combined with fluoride of boron, from which it separates on contact with water.

The fluoride of silicon does not yield ether with spirit of wood any more than with alcohol.

4. The fourth part of my essay has relation to the action of anhydrous sulphuric acid upon absolute alcohol. I have proven that, contrary to the received opinion, dry sulphuric acid cannot transform absolute alcohol into ether, and I have ascertained the condition under which this change takes place.

I have ascertained that a mixture of 2 atoms of anhydrous sulphuric acid and 1 atom of absolute alcohol never yields ether, but, that on using a mixture composed of 1 atom of each, etherification takes place at ordinary temperatures, that is to say at 140° to 160°. When a much larger proportion of alcohol is used, the excess distils over before etherification ; but when the quantity of acid is slightly increased a much greater quantity of ether is obtained. The proportions which have given the most ether are, 4 atoms acid to 3 absolute alcohol.

Etherification takes place but incompletely with anhydrous phosphoric acid, and only when the alcohol is in excess.

Anhydrous spirit of wood yields with anhydrous sulphuric acid, methylic ether, when the spirit of wood is in excess.

The most simple manner of accounting for etherification, both in relation to the chlorides and to the anhydrous acids, consists in assimilating the decomposition of the neuter or even basic alcohol compounds, to the decomposition of many of the salts of ammonia, which, from being neutral, pass by the action of heat to acid salts, on losing ammonia ; with this difference, however, that when the alcohol is displaced at the temperature of 140 or 150, it is changed into ether and water. The water is partly retained by the acids, and may even

be wholly changed by the etherifying chlorides, producing hydrochloric acid and an oxide. This mode of viewing the phenomena of etherification affords a ready explanation of how sulphuric acid is able to convert successively into ether an almost unlimited amount of alcohol of a suitable strength, added by little and little to the etherifying mixture ; it is not necessary to introduce an occult force as proposed by MM. Mitscherlich and Berzelius.

By considering etherification by a hydrated acid as the result of the decomposition of a bisulphate of alcohol or of ether, (sulphovinic acid,) the reaction is accounted for by attributing basic properties to water. Water does, in fact, play a part in these reactions, for I have well ascertained that, although 2 atoms of anhydrous acid do not yield ether with 1 of alcohol, on account of the excess of acid, yet a much larger proportion of ether is obtained by using 2 atoms of hydrated acid.

In every case of etherification, it is necessary that the decomposition of the alcoholic compounds should take place at 130° to 140° to yield ether. The evidence of this fact will be found in the last part of my essay.

5. I have ascertained that when we distil in vacuo, a mixture of 2 atoms of anhydrous sulphuric acid and 1 of absolute alcohol, a mixture which, under ordinary circumstances, yields ether, ebullition commences at 50° ; alcohol distills up to 140°, at which temperature oil of wine and water without ether pass over.

With etherifying chlorides the results are analogous ; they do not form a sensible quantity of hydrochloric ether, but with these the oil does not distil even at 160°.

In the reaction of sulphuric acid, the formation of oil of wine without ether at 104°, after a disengagement of alcohol, is worthy of remark ; it shows that for etherification in general the temperature of about 140° is absolutely necessary.

As to the oily carburets, they may be obtained even in the cold ; as is demonstrated by the slow action of fluoride of boron on absolute alcohol.

In the great number of experiments set forth in this essay, there is, without doubt, some that merit a more extended examination. Such are the reactions of anhydrous acids and chlorides upon the ethers of the hydracids, and by consequence on organic ethers; the slow action of etherifying chlorides and fluorides upon alcohol; analytic research is necessary to obtain fixed ideas on some points, especially on the nature of the liquid methylic ether produced by the action of the chlorides; upon the crystalline compound obtained by the action of water on the result of the slow decomposition of fluoride of boron by alcohol; it is finally proper to examine into the analogy which exists between the compounds I have described and the ethereal salts of Zeize. It would have been more agreeable to me to complete the extent of my researches, but business occupations hindering the further pursuit of this work at present, I have thought proper, on account of the interest of the theoretical question, to bring them, although imperfect, to the knowledge of chemists, and call their attention to the different points which are left undecided.

Journ. de Pharm.

ART. VIII.—NOTE UPON THE CINCHONA BICOLORATA.

The bark, which bears the designation at the head of this article, is ranged by systematic writers among the *False Cinchonas*. The specific name, *bicolorata*, has been more especially bestowed upon it by the continental druggists, while with the English it is known as *Cinchona pitaya*. As the article has made its appearance in this market, we have been induced to present the following information with respect to it, derived from the authorities to which we have had access. The bark itself is described by Guibourt in the following manner: "It is found under the form of straight quills, eight or ten inches long, completely rolled in double or single quills from half a line to three quarters thick, hard and compact, not fibrous, with a short fracture. The exterior surface is very even, of a uniform yellowish gray; the interior surface is of a deep brown or blackish color, sometimes gray, like the exterior, and then the bark does not present, in truth, the two colors, from which has originated its name. The fracture is deep orange; the taste is bitter, disagreeable, analogous to that of angustura; it has no odor. The powder has the color of that of the pale and red barks mixed." This description is not strictly accurate, as, in it is omitted the peculiarity of the external surface, which is of a grayish ashen color, like some of the varieties of *Cinchona palldia*, with irregular ovoid patches of a white appearance, strongly contrasting with the other portion of the surface, and slightly depressed below its level, so as to exhibit a determinate line of separation between them. These patches are of greater size, more irregular and numerous in the larger quills than in the smaller. It is, therefore, most probable that the two distinct colors upon the surface has bestowed the distinguishing name of *bicolorata*.

Merat and Delens state that the true source of the drug un-

der consideration is unknown ; it has been suspected that it came from Buenos Ayres. It appears, however, that the English obtain it from the neighborhood of Bogota, and we are disposed to attribute the specimens in our possession to a similar source, as the commercial house into whose hands it came, derived it by way of New Orleans. This route would, most probably, be only taken by an article which was produced at the northern extremity of the bark region, within the district of country known as Colombia.

The same authors conjecture that it is the same bark that was received in Hamburgh in 1819 and 1821, under the name of *Atacamez* or *Tacamez*, and also the same as that described as the *Quina alaranjada* in the *Quinologie* of Balasco, as well as the Memoirs of the Academy of Lisbon for 1814.

The *Cinchona pitaya* of Fee, which is the same as the Piton or St. Lucia bark, must not be confounded with the preceding, which is known as the *C. bicolorata* to this author. The Piton bark is derived from the *Exostemma florabunda*. Batka appears to have confounded the two, and therefore referred the latter to this source; with respect to the plant which affords the bark under consideration, nothing worthy of reliance, has been presented to the public. The conjectures which have been made by the several authors, whose attention has been directed to the subject, are not worth citation. From the analysis which has been made by Bergen, it appears not to contain either cinchonia or quinia, and Prof. Pfaff regards it as not essentially different from other bitters. Pelletier and Petroz, who have also analyzed this bark, obtained from Brera, have detected neither of these two principles, but a bitter substance analogous to colocynthine, which can be given in the doses of from 12 to 24 grains. Cardone, the younger, has detected a yellow principle (resembling that of pale bark,) resin, malic acid, a bitter principle, some mucilage and numerous salts. There was discovered neither tannin or starch.* Guibourt, who appears to have made some chemical experiments with this

* Merat and Delens.

bark, reports, in the table accompanying the description of the false cinchonas, the following reactions: the infusion red dened litmus, with gelatine formed a slight cloudiness, with oak bark a precipitate, with galls a precipitate, with sulphate of iron a greenish black precipitate, with oxalate of ammonia a colored precipitate, with tartar emetic no reaction.

It results from the experiments of Brera,—1st, that the *Cinchona bicolorata,* when given in the quantity of half an ounce, cures intermittent fevers, while two ounces of the common cinchona is required. 2d, that the fevers which are cured by it rarely reappear, which happens when Peruvian bark is employed. 3d, that it has operated with great efficacy in a pernicious cardialgic fever, with vomiting. 4th, that the small quantity in which it is used prevents it from occasioning irritation: it possesses, on the contrary, the property of allaying vomiting, as in the case cited. 5th, that when employed in intermittent fevers, with inflammatory complication, it cures the fever without augmenting the inflammation. Drs. Carminati and Palleta have employed it with the same success, and before them the physicians of Trevise, Ghirlanda, Lovadina, Mainer, Ciotic, Adami, &c.; J. Zanelti, pharmaceutist, of the same city, was the first who pointed out the distinction of this bark from ordinary cinchona.*

In conclusion we may remark, that it has been supposed to be a kind of false angustura; if, by this, it is presumed to contain either brucia or strychnia, such a supposition is evidently erroneous. It may, however, have been confounded with ordinary angustura bark. In a collection of specimens placed at our disposal by a distinguished druggist of this city, is contained one of the bark in question, which is labelled *Cinchona angustura.*

Philadelphia, April 1st. J. C.

*Op. citat.

ART. IX.—HISTORICAL REMARKS CONCERNING THE GREEK FIRE. By J. J. Virey.

Entrusted by the Historical Committee, established by the Minister of Public Instruction, with the examination of the unpublished documents of the fourteenth and fifteenth centuries, relative to the *Greek fire*, we have ascertained that it consists of pyrotechnical compounds, such as resins, camphor, volatile oil of turpentine associated with sulphur, or bitumen, or naptha, and mixed up with nitre to facilitate their combustion; this matter is disposed in the form of a rocket, and enveloped with hide, and projected by artillery. Such are the formulæ for the pretended Greek fire, divulged as secrets by P. Cataneo and other ingenious artificers of the sixteenth and later centuries.

It is obvious that such mixtures do not constitute the true Greek fire, which inflamed under water, and was likewise inextinguishable, according to the reports of the Byzantine historians, Tonarus and Nicetas. Theophanes and Cedrenus attribute its discovery to the Syrian engineer, Callinicus, or to a more ancient author, Marcus Gracchus.

If it be true that the Emperor Constantine burnt, by these means, the fleet of the Saracens in the Hellespont, if he caused this state secret to be kept concealed from other nations up to the tenth century, and, finally, if Vreeahardouin, the lord de Joinville, and other historians of the crusades speak with affright of the terrible explosions of this fire, projected from mortars at the siege of Damietta, in red hot globes of the size of a cask, the compositions before cited cannot be correct.

But we find other curious notices in some ancient writings of the alchymists or Rosicrucians of the middle ages. These are no other than inflammable matters well known, but chemical combinations imperfectly studied, or concealed by design, and capable of dangerous explosion. Julius Cæsar Scaliger

was apprised by them, that with a kind of alum, a compound could be formed which would take fire by contact with water, or even with saliva (*sputo accenditur;*) this is preserved in a vessel hermetically sealed, named αστιοχος by the Greeks, who projected it against their enemies. This was probably a fulminating powder similar to Homberg's pyrophorus, formed from the sulphate of alumina, potassa, and carbon, which takes fire by moisture, or some of the compounds of sulphur, with the regulus of antimony and bismuth, recently discovered by Serullus, and exploding under water.

It is certain that many adventurous attempts of the alchymists, then produced, independently of gunpowder, formidable preparations of which the processes remained secret; it is on this account that every thing which may throw light upon the ancient compositions merits the attention of chemists.

Journ. de Pharmacie.

ART. X.—OF GUARANA AND ITS USE IN MEDICINE UNDER THE NAME OF PAULLINIA. By M. de Dechasteles.

Some months since, a very interesting notice, by Dr. Garvelle, of the guarana or paullinia, has drawn the attention of many practitioners to this new medicine. The frequent use made of the guarana by Dr. Garvelle, whilst physician to Don Pedro, in Brazil, and the good effects which he has since obtained in France, have induced me to communicate to the Society of Pharmacy the different preparations and formulæ in which this medicine has been prescribed by many physicians.

As for the eminently tonic properties possessed by guarana, (called more judiciously by Dr. Garvelle, paullinia,) they may be well attributed to the *tannate of cafeine*, which we have proven to exist in so great a quantity, according to the ana-

lysis made by M. Berthemot and myself, (Journ. de Pharm. Aout, 1840.)

By our experiments it will be perceived that alcohol is the only solvent which will exhaust the guarana of all its active properties; consequently it is necessary to use the hydro-alcoholic extracts, for the different preparations of this medicine.

I will merely call to mind that this extract is obtained by exhausting the guarana with boiling alcohol of 22°, distilling the tincture to withdraw a large part of the alcohol, and then evaporating to the consistency of a pillular extract.

Lozenges of Guarana or Paullinia.

℞ Hydro-alcoholic extract of Guarana 21 gram. 3 decigram. (329 gr.)
Sugar scented with Vanilla 500 gram. (7722 gr.)
Mucilage of Tragacanth q. s.

To be made into lozenges to contain each about ½ gr. of the extract.

From 16 to 20 may be taken daily.

Syrup.

℞ Hydro-alcoholic extract 10 gram.
Simple syrup 1000 gram.

Dissolve the extract in a little boiling water, then add the syrup, and reduce to a proper consistence.

From 45 to 60 grammes may be taken daily.

Pills.

℞ Hydro-alcoholic extracts, any quantity to be made into pills, each containing 1 decigram (1½ gr.) of the extract.

Four or five to be taken daily.

Tincture.

℞ Hydro-alcoholic extract 32 grms. (50 grs.)
Alcohol 500 " (7722 grs.)

Dissolve the extract in the alcohol by the aid of heat.

Ointment.

℞ Hydro-alcoholic extract 8 gram.
Lard 64 "

Soften the extract with boiling water and incorporate it with the lard.

Administration of the Powder of Guarana or Paullinia.

Many physicians employ it in powder, after the manner of the Brazilians, but always with sweetened water.

℞ Powder of Guarana 4 grams.
Scented Sugar 16 "

One or two powders daily.

Tonic Chocolate of Guarana.

℞ Chocolate 500 grams. (7722 grs.)
Powder of Guarana 32 " (50 grs.)

Journ. de Pharm.

ART. XI.—ON KERMES MINERAL. By M. H. Rose.

There is no preparation of antimony which has been subjected to the same amount of study and analytic research as *Kermes mineral;* nevertheless, chemists do not seem to agree in regard to its composition. The greater number, and among these, MM. Gay Lussac, Liebig, Geiger, Henry, jr., Buchner, Robiquet, Duflos, Brandes, Bierman, Pagenstecher, and others, admit that it is composed chiefly of oxide of antimony, united to sulphuret of antimony, whilst Berzelius considers it as not differing from common sulphuret of antimony, SbS^3. Some of my own previous experiments correspond with those of Berzelius.

Kermes mineral differs according to its mode of preparation. I have examined the kermes as procured by three different processes.

1. *Kermes obtained by boiling sulphuret of antimony in a solution of an alkaline carbonate.* When sulphuret of antimony is boiled in a solution of an alkaline carbonate, there is formed a sulphuret of the alkaline metal, holding in solution sulphuret of antimony, a salt of sulphur, and oxide of antimony. The sulphuret of the alkaline metal dissolves, by aid of heat, much sulphuret of antimony, nearly all of which, on cooling, it abandons under the form of kermes, but a very small portion remaining in solution. The oxide of antimony formed, dissolves completely when sufficient of the alkaline carbonate is used; otherwise, a part precipitates, on cooling, along with the kermes; especially if this latter is allowed to remain sometime in contact with the liquid from which it was deposited. Under all circumstances this oxide is mechanically mixed, and not chemically combined with the kermes. Of this any one may be readily satisfied by microscopical examination of this product. True kermes appears under the form of red or reddish brown grains, and if it contains oxide of antimony, there is very clearly to be perceived, more or less abundant crystals, which for the most part are six-sided prisms, but which often appear under the form of fine needles; these are entirely absent when the antimony is dissolved in an excess of alkaline carbonate, under which circumstances there is a more considerable production of kermes.

The oxide of antimony, which may contaminate the kermes, is not combined with the alkali, but by analysis of the kermes, the alkali may always be obtained under the form of a sulphur salt. It contains a small quantity of sulphuret of potassium or sodium, as M. Berzelius has long since demonstrated; forming a salt of sulphur with the highest degree of sulphuration of antimony; SbS^3. It cannot be entirely separated from the kermes by washing. The quantity obtained with the kermes made by boiling sulphuret of antimony in a solution of an alkaline carbonate, is in reality very small.

The presence of oxide of antimony in kermes is easily recognisable without the use of the microscope, by fusion in an atmosphere of carbonic acid gas. The fused kermes, when free

from oxide, forms, when pulverised, a black powder, while if it contains oxide, it is more or less disposed to assume a reddish or brownish tint.

If kermes be heated for some time in hydrogen gas, the sulphuret of antimony, consisting of $\underline{Sb}S^3$, is reduced to metallic antimony, but the salt of sulphur does not undergo the least change, and any antimony which it may contain, united with a greater amount of sulphur, is not brought to a lower state by losing its sulphur. Only a small quantity of water is liberated with which the salt of sulphur was combined. It is usually considered that this water disengaged on treating kermes with hydrogen, is derived from the reduction of the oxide contained in the kermes.

The kermes, as a result of what we have said, cannot be identical with the mineral *Rothspiesglanzers*,* nor as an analogous compound, for this latter is, according to my researches, a compound of oxide of antimony and sulphuret $\underline{\ddot{Sb}}+2SbS^3$.

2. *Kermes prepared by fusing sulphuret of antimony with an alkaline carbonate.* This is the ordinary officinal kermes of the Pharmacopœias, which prescribe this mode of preparation.

On fusing the sulphuret of antimony with an alkaline carbonate, it is known that a large amount of metallic antimony separates. The common opinion with regard to this separation is, that the oxide of antimony, by an elevated temperature and the presence of an alkali, is resolved into the metal and antimonic acid.

When the kermes prepared in this way, after many washings, and while yet moist, is boiled with tartar and water, there is obtained from the filtered solution, by means of hydrosulphuric acid gas, a voluminous precipitate of sulphuret of antimony. This effect does not take place with a kermes prepared by boiling in a solution of alkaline carbonate; it contains no

* *Red antimony* of Saxony and Hungary. *Native kermes*, Delisle; *Hydrosulphuret of antimony*, Hauy.

oxide. The kermes obtained by fusion contains, therefore, oxide of antimony, and the oxide only, and not antimonic acid, for by ebullition in tartar, crystals of tartar emetic may be obtained.

I had supposed, depending upon the authority of MM. Gay-Lussac and Liebig, that the quantity of oxide of antimony in kermes, obtained by fusion, was very considerable. But I have long since changed this opinion, as I have found that this quantity varies very considerably according to the different modes of obtaining it, and bears no relation in quantity to the sulphuret of antimony. Microscopic examinations have confirmed this opinion, for kermes has the appearance of a mixed mass of red granules and crystals, the latter being in very variable quantity. We may even by this mode of preparation obtain a kermes which contains very little oxide, and which, after fusion, will yield, when pulverised in an atmosphere of carbonic acid, a powder almost black.

The principal cause of the presence of this oxide in kermes is, that by fusion with an alkaline carbonate, the sulphuret of antimony is completely decomposed, while, by boiling in a solution of the same, the greater part escapes alteration. By fusion there is formed oxide of antimony, and a metallic alkaline sulphuret which dissolves the sulphuret of antimony. On boiling the fused mass in water and cooling the filtered liquor, kermes mixed with oxide of antimony is deposited, this latter precipitating, because the undecomposed alkaline carbonate does not bear a sufficient relative proportion to the decomposed sulphuret of antimony.

This explanation of the reactions taking place in this product does not appear wholly exact, on account of the separation of metallic antimony, or rather there should be another process by which this separation may be explained.

If we concentrate by evaporation the liquor from which the kermes has been deposited, this liquor on cooling will deposit a considerable quantity of large crystals of a well known salt of sulphur, consisting (when carbonate of soda is used) of sulphuret of sodium and sulphuret of antimony, with a maxi-

mum of sulphur, $\underline{Sb}S^5$. If the solution be less at repose for a long time, crystals of carbonate of soda are formed, and there is left a combination of sulphuret of sodium and sulphuret of antimony with a minimum of sulphur, $\underline{Sb}S^3$.

The precipitation of metallic antimony by the fusion of sulphuret of antimony with an alkaline carbonate depends upon the fact that part of the sulphuret $\underline{Sb}S^3$ is changed into metal and into sulphuret of antimony with a maximum of sulphur $\underline{Sb}S^5$. This decomposition taking place from the predisposing affinity of the alkaline metallic sulphuret present, to form a salt of sulphur with the maximum sulphuret.

Less of this salt of sulphur is formed by boiling the sulphuret of antimony in a salt of sulphur, since, as before mentioned, this salt enters but in very small quantity into kermes thus prepared. Its presence should then be attributed to the oxidation of a small quantity of antimony in the persulphuret of antimony.

The most ancient method of procuring metallic antimony, (that of Basil Valentine,) by the mixture of nitre, crude tartaric acid, and sulphuret of antimony, equally depends upon the fact, that there is formed a salt of sulphur with persulphuret of antimony, in consequence of which metallic antimony is separated.

3. *Kermes prepared by boiling sulphuret of antimony in a solution of an alkaline hydrate.* This kermes in external appearance, has no resemblance with those prepared by other means. It forms a thick, voluminous precipitate, which it is difficult to wash and dry.

Boiled in its moist state with tartar, it does not yield oxide of antimony, and the microscope detects no appearances of this oxide. Treated by dilute hydrochloric acid, it disengages, at the first moments of reaction, sulphuretted hydrogen gas, becomes black, and resembles in every respect common sulphuret of antimony.

Treated with hydrogen and a high temperature, there is formed a metallic button, surrounded by a fused mass, upon

which the hydrogen has no action, and from which no sulphur sublimes.

This fused mass is a salt of sulphur composed of sulphuret of potassium and persulphuret of antimony, which is not decomposable by hydrogen and a high temperature. The quantity obtained is very considerable, and by a quantative analysis, appears to be in a determinate proportion to the sulphuret of antimony. The composition of kermes obtained by ebullition in an alkaline hydrate, according to this analysis, is expressed by the formula $(KS+\underline{Sb}S^5)+2\underline{Sb}S^3$; but by prolonged washing, more and more of the salt of sulphur may be taken away. The presence of persulphuret of antimony in this kermes should be attributed, as in that from an alkaline carbonate, to an oxidation of the antimony of the sulphuret by the presence of air.

Ann. der Pharm. and Journ. des Mines.

ART. XII.—ON THE EXTRACTION OF MORPHIA. By FR. MOHR.*

M. MOHR considers that the proposed process has the peculiar advantage of obtaining the morphia in the most short and easy manner, without the use of alcohol, in the crystalline form, and completely free from narcotine. This process consists in precipitating morphia from its solution in lime, by means of hydrochlorate of ammonia in powder, absolutely in the same way that Chenevix separates alumina from its alkaline solution.

Crude opium is to be macerated in successive portions of water, amounting to three times its own weight, being each time strongly expressed; three or four macerations are sufficient. These liquors are then to be added to a thick milk of lime, which should contain the lime in about one-sixth or one-

* Annal. der Chem. und Pharm.—Vol. xxv.

fourth part of the opium used. If the mixture of lime be poured into the boiling solution of opium, a mass separates, and, by fusion, agglutinates on the sides of the vessel, and is then dissolved with much difficulty. This takes place because the morphia is at first precipitated, while there is as yet not excess of lime to redissolve it. It is therefore better to add the solution of opium to the boiling milk of lime, or to mix both together at a boiling temperature, and afterwards apply heat to complete the process. The liquors are then allowed to boil for a few minutes. The effect produced by the milk of lime in decolorizing the liquors is remarkable. The narcotine is completely retained in the precipitate. The liquid, after boiling with the milk of lime, is then strained, and the residue washed with boiling water and expressed. The liquors are then evaporated to about double the weight of the opium, and promptly filtered to separate some carbonate of lime which is always formed. Again, heating the liquors to ebullition, sal ammoniac in powder is to be added in the proportion of 30 parts for over 500 parts of opium. The form in which the morphia separates, depends upon the state of concentration to which the solution of morphia in lime was brought by the evaporation: if this is very great, the addition of sal ammoniac produces immediately an abundant precipitate, which some minutes of ebullition changes into crystalline needles ; if more feeble, it sometimes does not immediately produce a precipitate, but soon after here and there may be distinguished some white needles ; the precipitate now appears with great promptness, and sometimes so many crystals are formed as to occupy on deposition one half the bulk of the liquid. Agitation sometimes promotes the crystallization.

The previous decolorization of the liquor by animal charcoal is unnecessary—for the lime itself produces a greater effect than the charcoal. The author is satisfied that sal ammoniac precipitates all the morphia from the solution in lime.—We, however, regret that he has not indicated the quantity of product, comparatively with the amount of opium employed.

Crystallized morphia thus obtained is not absolutely color-

less; to render it more pure it may be dissolved in hydrochloric acid, then boiled with milk of lime, and the filtered liquor precipitated by sal ammoniac. A. G. V.

Journ. de Pharm.

ART. XIII.—SELECTIONS FROM LASSAIGNE'S DICTIONNAIRE DES REACTIFS.—No. 1.

Translated by AUGUSTINE DUHAMEL.

Acetate of Morphia.

THIS salt, prepared by saturating weak acetic acid with pure morphia, and evaporating the solution to dryness, is presented in a grayish white mass, amorphous, granular, pulverulent, and of a disagreeable bitter taste; by spontaneous evaporation in a stove this salt may be obtained crystallized in fascicular needles. It is in the first form that it is met with in the shops for medicinal use.

Acetate of morphia is soluble in water and alcohol, but when evaporated to dryness, or has been a long time exposed to the air, it has lost a part of its acid, and does not then redissolve totally in water except a few drops of acid be added to it.

Composition. It is generally supposed to be formed like other neutral salts with organic basis, of one atom of acid united to one of morphia; consequently 100 parts contain,

Acetic Acid,	13.72	or	1	atom.
Morphia,	86.28	"	1	"
	100.			

Its formula is $\overset{+}{Mo}\ \overline{A}$.

Distinctive characters. 1st. Exposed to heat, acetate of morphia melts, puffs up a great deal, blackens and gives out an abundant smoke of an empyreumatic odor. The shining spongy

charcoal which results, calcined in a platina spoon over the flame of a spirit lamp, burns without any residue.

2d. Moistened with concentrated sulphuric acid and a few drops of water, and a mild heat applied, causes vapours of weak acetic acid to be disengaged.

3d. Concentrated nitric acid placed in contact with a small portion of this salt, gives to it immediately a blood-red color, which passes to the orange and afterwards to the yellow, but this phenomenon belongs also to another organic base and its compounds (Brucine.)

4th. A character peculiar to morphia and its salts is, according to the curious observations of Serullas, that of decomposing iodic acid dissolved in water. By placing in contact at the ordinary temperature, a solution of iodic acid with a single grain of *acetate of morphia*, the liquid becomes colored brownish red by the iodine set at liberty, developing immediately the odor of the latter.

The hundreth part of a grain is sufficient to produce a sensible effect, but to detect in this case the presence of iodine set at liberty, it is necessary to dissolve the salt in a few drops of solution of starch and add to it the iodic acid by means of a tube.

The blue color which appears by the iodide of starch thus formed, clearly indicates the decomposition of the iodic acid. An effect not less sensible and more prompt is produced by placing a drop of solution of iodic acid upon paper coated superficially with the starch, and then placing some *acetate of morphia* upon the wetted spot, which, after a few seconds, will take a decidedly blue tint.

5th. Upon moistening a small quantity of *acetate of morphia* with a solution of persulphate of iron or neutral chloride of iron, the mixture (according to M. Robinet,) takes a deep blue color which disappears by the addition of an acid.

6th. The aqueous concentrated solution of morphia precipitates in white flocks by potash, soda, and ammonia, but an excess of these bases redissolves the precipitate if the solution is primitively diluted to some extent with water. The infu-

sion of galls, owing to the tannic acid it contains, precipitates the morphia in the state of *tannate* under the form of white flocks, insoluble in water.

Acetate of morphia considered under a medico legal head. An exposure of the means of detecting the presence of this compound is rendered interesting from its well known poisoning effects, as well as the celebrity attached to it, acquired by a criminal prosecution in 1824 before the court of assizes at Paris, wherein Dr. Castaing was charged with the murder of his friend Hyppolyti Ballet, by poisoning him with *acetate of morphia.*

The man of art, charged with the duty of making the necessary experiments to prove poisoning by *acetate of morphia,* should submit to the above mentioned reactives what remains of the substance supposed to have occasioned death: he should treat it, as well as its aqueous solution, by the means pointed out in the description of the *distinctive characters* of this salt. He will direct his researches to the matters ejected by vomiting, as well as those gathered in the digestive organs after death.

When the matters under examination are liquid, it is necessary, after filtering, to evaporate them by a gentle heat in a porcelain capsule ; to treat the extract by boiling alcohol of 40°, and to separate, by filtration or decantation, the insoluble portion. The alcoholic solution then evaporated furnishes an extract in which the *acetate of morphia* crystallizes, if in sufficient quantity; or if not, its presence may be denoted by reactives.

If the matters extracted from the organs are solid, they should be boiled in a capsule with distilled water, acidulated with acetic or hydrochloric acid, and the liquid treated as above directed.

In these investigations the liquids extracted are generally more or less colored—and makes it necessary to discolor them either with purified animal charcoal or to precipitate the coloring matter by subacetate of lead; filter, and pass a current of hydrosulphuric acid gas to separate the excess of lead.

By the aid of these processes which have been put into practice by Messrs. Orfila and Lesueur, it has been frequently possible to discover the presence of very small quantities of *acetate of morphia* in the stomach and digestive canal of men and animals several months after death.

M. Orfila publicly declared, that he could discover in one pint of liquid, by exact analysis, half a grain of *acetate of morphia.*

ART. XIV.—CHEMICAL EXAMINATION OF THE STROBILES OF THE HOP, (HUMULUS LUPULUS.) By T. G. Leroy.

(*Read before the Society of Medical and Natural Sciences of Brussels.*)

The hop is an indigenous plant, which, for a long period of time, has constituted one of the most important branches of agriculture and commerce in Flanders; it is from this country even that it was taken to England, about the year 1524, in the reign of Henry VIII. It was then cultivated with success in the counties of Kent, Essex, and Surrey, and finally extended to the southern and western parts of the kingdom. Within the last century, this culture has obtained so much success, that it is not only sufficient for the supply of England, Scotland and Ireland, but a large amount of hops are exported to foreign countries.

This plant occupies a distinguished place among those most useful to man. The rigors of winter are not felt by it, the stalks have scarcely commenced to grow before the young shoots afford subsistence among the earliest of the season, prepared and eaten as asparagus. These shoots are agreeable to the taste, but leave a light degree of acridity upon the palate; this acridity is due to a principle which I shall indicate directly.

Most persons who eat the young shoots of the hop, are not incommoded by this acridity, yet I am acquainted with one,

who, whenever he partakes of them, is attacked with violent irritation of his throat.

Beside the employment of the young shoots indicated above, the stems, when macerated in water, afford a coarse threading, analogous to that of hemp, and from which excellent cording can be fabricated. It is to be regretted that our cultivators do not seek to employ this part of the plant which they reject as useless, and which might furnish to commerce yet one more product. All animals eat the plant with avidity, and its leaves and suckers, when young and delicate, afford them excellent nourishment.

Finally, every body knows the use which is made of the fruit or cones, (*strobiles,*) in the north of Europe, for flavoring beer and preventing it from becoming sour. Employed for this purpose the hop must necessarily be placed in the first rank of plants—the most cultivated and most interesting. M. Richard informs us, that in England small pillows of its strobiles are placed under the head, in cases of insomnolence. It is rare, says he, that this measure is not productive of calm and restorative sleep. From their narcotic property, they are in addition employed internally in medicine, either in decoction or infusion, but this property is not manifest except in large quantity ; thus many persons experience, after having drank several glasses of beer, an insurmountable desire to sleep. But in the decoction, or infusion, which is prepared from two drachms of the strobiles, this stupifying action is almost inappreciable.

The portion of the plant which has been the principal object of the researches of chemists, is the yellow powder; this is golden, resiniform, aromatic and bitter; it is found upon the woolly foliaceous scales, which constitute the cones at the period of maturity. This powder was first studied by Dr. Ives, of New York, who named it *lupuline.* The researches of MM. Chevalier and Payen have demonstrated (*Journal de Pharmacie,* vol. viii., p. 209,) that this substance is composed of resin, volatile oil, a bitter principle, gum, extractive matter, fatty matter, &c.

MM. Sebailliff and Raspail, the first who have examined this substance with the microscope, have found it composed of globules filled with a yellow matter, and under this view have pointed out its analogy with pollen. From many experiments, the lupuline appears to be the active principle of the fruit of the hop.

So far as I am aware, no chemical researches have been made with the view of determining the principles found in the young shoots; the desire of determining what it is in them which affects the throat, induced me to undertake their analysis; my intention being only to isolate the principles, without endeavoring to determine their quantity, I shall confine myself therefore to merely indicating them.

I took the shoots of the hop, which I washed in cold water in order to free them from the earth which adhered to them, and I allowed them to dry for half an hour; they were then bruised in a marble mortar and placed in a press to extract the juice in the usual way. The juice which flowed from them was clear, slightly yellowish, having a peculiar odor, a sweet taste, slightly sugary; it reddened litmus paper; tested with persulphate of iron it changed to a bluish black. In a few minutes after the juice is procured, it becomes cloudy, a slight fermentation takes place with the formation of froth upon the surface, while a pretty abundant precipitate is formed. I allowed the reaction to continue for twenty-four hours, and finally filtered in order to separate the liquid portion.

A. *Examination of the liquid portion.*

The filtered portion was clear, of a slightly yellowish tint, of the same odor, and taste as before. The same action was exhibited with litmus paper. It was exposed to a temperature of from 70 to 75 during an hour; the albumen which formed was separated by filtration, when the liquid was evaporated by a salt water bath to the syrupy consistence; treated with alcohol, it afforded a gummy and extractive precipitate.—During the evaporation, there was remarked, here and there, a supernatant liquid of a yellowish brown color, of an oily appearance, of a very strong odor, similar to that of rancid white

soap; this fluid was removed carefully for examination. The alcoholic solution was a pale yellow; after twenty-four hours it cleared; it was separated from the precipitate solely by decantation, and submitted to spontaneous evaporation; at the expiration of several days, there were remarked a crowd of small crystals which lined the sides of the capsules; I regarded them in the first instance as crystallized sugar from the sugary principle; during the evaporation gummy matter was also deposited upon the sides of the capsule.

B. *Examination of the matter left on the filter.*

This was allowed to remain some days upon the filter to facilitate the removal of the fluid part; from the gray color, which it presented at the time of precipitation; it passed to a wine-red by exposure to the atmosphere, a coloration due doubtless to a principle which becomes modified by the action of the air, as is observed in some coloring substances; on another occasion I again observed this fact of coloration, but of less intensity. Once having set aside the water which had been boiled with the young shoot of hops, I remarked at the end of twelve or fifteen days, that it had acquired a beautiful rose color, a coloration which I attributed to the influence of the chloride of sodium, which is used in cooking vegetables. The matter which remained upon the filter, partakes in a high degree of the odor of the oily substance already alluded to; its taste is slightly sweetish; it was treated at several repeated times and for several days with alcohol at 0.837; this removed from it the sugary principle and the oily appearance; the part which was not acted upon by alcohol, was without taste and odor; exposed for several days to contact of air, it became hard, and presented the consistence of corneous matter; finally, after prolonged contact, it became blackened and friable; it resisted the action of ether, and was slightly attacked by acetic acid and caustic potassa; heated in a glass tube, it gave out ammoniacal products. From these characteristics, I am induced to consider it as composed in great part of insoluble albumen; I have not determined the presence of amylaceous principle.

C. *Examination of the crystalline matter.*

The crystalline substance which was observed during the evaporation of the alcohol, was still found in a part of the juice which had been freed by heat from all albumen ; this had been concentrated by evaporation and allowed to remain undisturbed several days, when there was formed a crystalline precipitate, which was separated by filtration; the portion filtered had an acid and sweet taste; the acid was separated by the neutral acetate of lead ; I obtained a precipitate, which, when washed and decomposed by a sufficient quantity of sulphuric acid, presented a product which had the characters of malic acid. That which remained upon the filter was washed with a small quantity of water and added to the crystals obtained during the spontaneous evaporation of the alcoholic solution. They were redissolved with a sufficient quantity of water, the solution subjected to slight evaporation, and then allowed to deposit its crystals. They are hard, white, of perfect cleanliness ; their form that of rhomboid, some of them hexagonal prisms ; they are without odor, taste slight ; soluble in about sixty times their weight of water; less soluble in alcohol of 0.852 ; reduced to powder and placed upon a piece of litmus paper previously moistened with distilled water, they immediately reddened it ; the aqueous solution treated by a solution of chloride of barium, with neutral acetate of lead and protosulphate of iron, presented nothing remarkable. Heated in a glass tube with a spirit lamp, they soon disengaged a strong ammoniacal odor; reddened litmus paper introduced into this tube soon became blue; they left a carbonaceous residuum, which, when treated with cold nitric acid, gave rise to no appreciable phenomenon.

All the properties which I have detected in this substance, have assured me that it was *asparamide.*

Asparamide has hitherto not been obtained but in a small number of vegetables; in the first instance by MM. Vauquelin and Robiquet, in the sprouts of the asparagus; in 1816 by M. Bacon, Prof. of chemistry at Caen, in the root of the mallows. He regarded it as a combination of malic acid and a

peculiar vegetable alkali to which he gave the name of *altheine;* but Plisson having examined it, recognised it as a principle similar to that derived from asparagus. More recently M. Blondeau, a pharmaceutist of Paris, has detected the presence of the same principle in the root of the large comfrey. Vauquelin has moreover detected it in the potato, and M. Robiquet in the root of the liquorice, where it bears the name of agedoite. Finally, its presence has been determined in the species of ornithogalum.

D. *Examination of the matter of oily appearance.*

The small quantity of this matter obtained from a certain quantity of juice during evaporation, was united to that extracted by alcohol from the precipitate ; it presented itself under the form of a liquid of oily consistence, of a yellowish brown color, having a sweet taste at first, afterwards slightly bitter; active in producing acridity in the throat; in every respect similar to that remaining after eating the young shoots, but more decided; its odor recalls that of rancid soap;—it was treated with hydrated ether, in which it dissolved completely. The solution allowed to evaporate spontaneously left as a residuum—1, a solid substance, of a white appearance, under the form of small grains or lumps ; 2, a brownish oily liquid which covered the solid matter. These two substances being equally soluble in alcohol and ether, it is difficult to isolate them completely, yet the solid part being specifically the heaviest, I had recourse to this property. I poured water upon the residue of the ethereal evaporation and agitated strongly; after a few moments of repose, the solid portion was held in suspension in the water, the largest fragments occupied the bottom; the liquid portion, which was supernatant, was dissolved by ether, which I poured upon the top and removed with a syphon.

E. *Examination of the solid matter.*

This is white, taste sweet, analogous to that of white soap, slightly acrid, which I attribute to the presence of a certain quantity of liquid oily matter; its odor is feeble, it is soluble

in alcohol and ether; the alcoholic solution, when it is much concentrated, allows a deposition under the form of pearly scales; this solution reddened litmus paper, it precipitates the neutral acetate of lead, the nitrate of silver and sulphate of copper. The solid matter exposed to a temperature of 70° or 75° is not liquified, but gives rise to some disengagement of air, and is finally rendered slightly brown.

F. *Examination of the liquid product.*

This liquid has a brownish yellow color, a very penetrating odor, which resembles that of rancid soap; its taste is sweet in the first instance, then a little bitter, and soon produces acridity in the throat; an acridity which has some resemblance to that produced by the oil of the Croton tiglium; it is soluble in alcohol and ether, and reddens litmus paper, previously moistened with distilled water. Exposed to a temperature a little elevated, it becomes volatilized in part, giving off a whitish vapour; the part not volatilized becomes slightly brownish and thickened; litmus paper moistened and plunged into the vapor undergoes no change. Finally, from the whole of the physical properties, this oily matter is similar to the fixed oils: it loses its rancid odor by time. It is to this principle that the young shoots of the hop owe their light degree of acridity.

To judge from the examinations which I made, these two last products appear to be acid in their nature. I regret not having obtained sufficient of them to study them well. While in doubt, I shall content myself with indicating the solid substance by the name of resin, and the liquid substance by that of oil.

From what we have just seen, it will be admitted that the young shoots of the hop possess the following constituents:

1st, Albumen, insoluble; 2d, Albumen, soluble; 3d, Gum, or mucilage; 4th, Sugary matter; 5th, Extractive matter; 6th, Red coloring matter; 7th, Asparamide; 8th, Resinous matter; 9th, Oily matter; 10th, Tannin; 11th, Malic acid; 12th, Malate of lime; 13th, Sulphate of potassa.

ART. XV.—NOTICE OF SEVERAL PREPARATIONS OF IRON.

By M. Beral, Pharmaceutist.

Experiments undertaken for the purpose of rendering more perfect the preparations of iron used in medicine, have led me to the discovery of several ferruginous products, not yet examined, or but little known. I shall make known the more prominent properties of each of these products so as to complete what I have already published on ferruginous compounds in general, and the citrate of iron in particular. I take advantage of this occasion to communicate the formulæ of several medicines, of which the use is becoming extensive, and which have not yet been published in any work.

Sesquicitrate of Iron.

The citrate of the sesquioxide of iron is obtained under the form of transparent plates, of a beautiful garnish hue. This salt, remarkable in every respect, dissolves in water with great facility, forming a permanent solution with but little taste. This preparation forms the base of many pharmaceutical compounds, appropriated to the healing art, and will themselves afford the subject of a future essay.

Citrate of protoxide of Iron.

Citrate of the protoxide of iron is prepared by treating iron filings with citric acid, previously dissolved in distilled water. This salt is white and pulverulent, and but slightly soluble. It is rapidly colored by light, and by the action of moist air its composition is modified, the iron passing to a higher degree of oxidation. This citrate, like the other salts of iron, has a strongly marked chalybeate taste.

Citrate of the Magnetic oxide of Iron.

Combined with magnetic oxide of iron, citric acid furnished an uncrystallizable salt, of a green color, and sus-

ceptible of being formed into transparent tablets. This salt is soluble and very active; but as its taste is decidedly chalybeate, it perhaps cannot be employed internally. It is remarkable that its solution does not alter, but preserves its green color, although exposed to the prolonged action of the atmospheric air.

Citrate of protoxide of iron and quinia.

The citrate of iron and quinia is a new salt, which was needed in disease. This medicine is formed by the combination of four parts of citrate of iron, with one part of citrate of quinia. It is obtained under the form of transparent plates, soluble, very bitter, and of a garnet hue.

It is only in the form of pills that this salt can be used on account of its great bitterness.

Chalybeate wine of quinquina.

Composed of elements which were supposed incompatible, the chalybeate wine of quinquina constitutes a new medicine, the necessity of which is frequently seen, and which, in the hands of physicians, receives numerous useful applications.

Fifty grammes of this wine contains 1 gramme of citrate of iron and the soluble principle of 3 grammes of quinquina: the quantity may be increased at pleasure.

Tannate of the sesquioxide of iron,

Is obtained by adding a decoction of galls to a solution of a sesquisalt of iron. This tannate is blue, insoluble and without taste. Its properties are not very manifest.

Syrup of tannate of iron.

℞—Simple syrup, - - - - -	375	parts.
Syrup of vinegar, - - - -	125	"
Citrate of magnetic oxide of iron, -	10	"
Extract of galls, - - - - -	4	"

Mixed and made into a syrup.

Many physicians use the tannate of iron under the form of syrup. As the iron in this preparation is in the state of the magnetic

oxide, and united with an acid, it is soluble and susceptible of receiving useful applications.

Syrup of iodide of iron.

℞—Simple syrup, - - - -	200 grammes.
Liquid iodide of iron, - -	1 grain.

Each spoonful of this syrup contains 1 grain or 5 centigrammes of dry iodide of iron.

As soon as a solution of iodide of iron is placed in contact with atmospheric air, a part of the iron oxidizes, and a corresponding quantity of the iodine is set free. This circumstance modifies the action of the medicine in a bad manner and injures very much its use.

Water, saturated with sugar, has the property of protecting the iron from oxidation; it is therefore under the form of syrup only that we can employ the iodide of iron.

Saccharate of lime.

℞—Simple syrup, - - - -	1000 grammes.
Quick lime, - - - -	10 "
Water, - - - - -	100 "

Slack the lime with the water, and add the syrup to the mixture, boil for ten minutes and filter through paper, then add to the product four times its weight of simple syrup.

It was Prof. Trousseau who used this remedy. He employed it in chronic diarrhœas and dysentery.

Lactate of iron.

As all pharmaceutists can procure lactate of lime at the price of 20 fr. for 500 grammes, the lactate of iron may be prepared in every laboratory. The following is a simple process and succeeds well.

Dissolve 500 grammes of lactate of lime in 2 killogrammes of boiling water; precipitate the lime by oxalic acid, which forms an insoluble oxalate and filter. The liquid obtained contains lactic acid, which being placed in contact with iron filings and heated for six or eight hours yields, on cooling, very white lactate

of iron in a crystalline powder; it only remains to separate the excess of iron, and to wash with alcohol and dry it.

On treating sesquioxide of iron with lactic acid, I obtained a soluble lactate of a red color, but I have not yet sufficiently examined it to ascertain all its characters.

Journ. de Chim. Med.

ART. XVI.—NOTICE OF THE HACHISCH.

In a work published by Dr. Aubert, he has devoted an article to a particular substance, to which M. Sacy has given the name of *hachisch*, and which is in general use among the Arabs. This substance produces a species of intoxication. Dr. Aubert has examined this vegetable; the following are his observations:

"If we examine the leaves, the flowers, and the fruit of this plant, we will recognise a species of hemp grown on sterile ground. The hachisch is in fact of the same family and the same genus. It is an annual plant which grows in the whole of Lower Egypt, where it is an article of great consumption and commerce. We are assured that it is likewise cultivated in Syria and some parts of Asia Minor. The difference which exists between the hemp and the hachisch is in the stalk; this latter has the height of but two or three feet; its stalk is not simple, but branching even from the base. The branches are alternate, and we do not find on its stalk the same filaments as on the hemp. The odor is less strong than hemp, and is somewhat peculiar. The most common and certain mode of proving its effects is to make a decoction of the plant, then add fresh butter, and leave the whole on the fire until the liquid is totally evaporated; it is then strained. The butter has now acquired a beautiful green color. It is used mixed with sugar, pistachio nuts and other ingredients."

Dr. Aubert states its effects as follows:

"I took it in the form of sugar lozenges of a green color, and having a slightly nauseous taste, but very well disguised by pistachio nuts, and essence of roses and jasmin. The effects were but slightly marked upon myself; not being acquainted with the substance, I was prudent in its use. One of us imagined that he would die of apoplexy during the night, and commenced lecturing us on our mode of living and conducting ourselves. I was much astonished at the gaiety which was produced, and the strange ideas uttered, and those which passed through my brain.

"Some days afterwards I doubled the dose of the sugar containing the hachisch, and laid myself down upon the divan, drinking coffee to develope the effects of this substance. I soon perceived an itching in my feet, and a sensation of compression in my head, which was suddenly dissipated, and my skull seemed empty. I then experienced peculiar sensations; every thing appeared in a new form; the figure of my neighbour seemed the most grotesque imaginable; I burst into laughter at his nose, and continued laughing for near an hour; every thing excited it. During this time the most singular and diversified ideas passed through my brain with astonishing rapidity. I felt in a perfect state of existence without any painful feelings; the past, the present, and the future no longer existed, there was nothing to me but the fleeting moments; it was the most complete *dolce farniente.* Finally, every thing became calm, and the desire of sleep invaded me. The whole night passed in an agreeable revery.

On awakening I possessed an exact remembrance of every thing which had passed; my head did not ache, and I had not the parched mouth, the consequence of intoxication from opium or wine.

"I continued to take this substance with my friends, to study the effects produced upon us.

"The first of these effects is the extreme pleasure which one has to stretch himself upon the divan, to smoke, and to take coffee, with a repugnance to every species of motion. After-

wards the eyes close as if pained by the light; most singular ideas begin to rise; loud laughter and extravagances of words and actions supervene. The Arabs call this last *fantasia.* In the midst of all comes an appetite almost canine, with a repugnance to wine. At table the effects increase, then gradually diminish, and terminate in a sweet sleep and agreeable dreams; there is no headache, no fatigue, no oppression of breathing.

"The effect on the nervous system is pleasant, well characterized in its actions by hunger, extravagance, rapidity of ideas, and a continual combat of self with instinct."

It is desirable that new trials made in France should confirm these curious details given by Dr. Aubert.

Journ. de Pharm.

ART. XVII.—MODIFICATION OF THE PROCESS OF M. GAROT FOR COVERING PILLS By M. Vee.

(*Extract from the Journ. des Connaiss. Med. et Pharm.*)

The process pointed out by M. Garot for covering pills, by dipping them in a solution of gelatine, is sometimes difficult of execution; thus, if the pillular mass is soft, if it contains oils or oleoresins, as copaiba, for example, the gelatin on drying contracts with so much force, that a portion of its contents is inevitably pressed out. This inconvenience may be partly obviated by adding to the gelatine some gum or sugar. The following mixture succeeds perfectly :

℞—Dry gelatine,	- - - - -	1 part.
Jujube paste,	- - - - -	7 "

Water, a sufficient quantity to dissolve the above, and form a syrupy solution when placed on a salt water bath. This solution is to be used in the same way as that of M. Garot. When we wish to prepare a large bolus, and to enclose oils or liquid resins, it is necessary to dip them a second time, after the space of quarter of an hour.

The mixture which we advise, adds the author, dries almost as promptly as pure gelatine, contracts less, and leaves an agreeable taste which may be varied by the addition of different aromatics. *Journ. de Pharm.*

ART. XVIII.—FORMULÆ OF SEVERAL PREPARATIONS OF CUBEBS, EMPLOYED BY DR. PUCHE AT THE HOSPITAL OF MIDI.

Liquid aqueous extract of cubebs.

Take of powdered cubebs q. s., and form, with one and a half times its weight of boiling water, a soft paste, which is, after several hours contact, to be expressed; the residue is to be subjected to several successive portions of water, and again expressed until a quantity of liquid, equal in weight to the cubebs employed, is obtained. An eighth part of alcohol is then to be added, and the liquid kept in a cool place.

Liquid alcoholic extract of cubebs.

This extract is no other than a tincture of cubebs, prepared in a displacement apparatus, by means of powdered cubebs and alcohol of 22°, in quantity sufficient to yield an amount of liquid equal to the weight of the cubebs employed.

Syrup of the alcoholic extract of cubebs.

Simple syrup, and liquid alcoholic extract of cubebs, are to be mixed in equal parts, and evaporated, at first in an alembic on a salt water bath, then in an open vessel, until the syrup is reduced to its former weight.

Bolus of cubebs—Bolus of cubebs, copaiba and turpentine.

Dr. Puche often prepares oval boluses of cubebs, each containing a gramme of powdered cubebs, and others of the same weight, composed of equal parts of copaiba, spirits of turpentine and powdered cubebs. All are covered with the gelatinous mixture recommended by M. Vée. *Journ. de Pharm.*

MINUTES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

A SPECIAL meeting of the Philadelphia College of Pharmacy was held Eleventh mo. (Nov.) 6th, 1840.

A quorum being present, the Vice President called for the object for which the meeting was convened. Whereupon, WM. R. FISHER stated it to be, to receive the report of the "Committee of Revision," appointed in March last, to revise the United States Pharmacopœia.

The report was then read and adopted, and the Treasurer was directed to pay the amount of the expenses incurred by the Committee.

A vote of thanks was tendered to the Committe, and unani mously agreed to, and the Vice President was directed to prepare the same and produce it at a future meeting of the College.

A copy of the report is in the hands of the Publishing Committee.* On motion adjourned.

C. ELLIS, Secretary.

Stated meeting, held Third mo., (March,) 29th, 1841.

HENRY TROTH, Vice President, in the Chair.

The minutes of the former meetings were read and approved. The minutes of the Board of Trustees were read, from which the College is informed that PAUL G. OLIVER, J. C. DE LACOUR, and CHARLES M. WILSTACH, are recommended to be associated with us in membership, and not being eligible by the Board, they were ballotted for and declared to be duly elected resident members of this College.

The resignations of ABRAHAM KUNZI, JOHN FARR, and CALEB E. PLEASANTS, were accepted.

The Publishing Committee made a verbal report, stating the usual prosperous condition of the American Journal of

* This Report will be presented to the public as soon as the Pharmacopœia has been completed by the Committee of the Convention.

Pharmacy, the publication of which was entrusted to their care.

This being the annual meeting for the election of Officers, Trustees, &c., the following gentlemen were declared to be duly elected, viz.:

President—DANIEL B. SMITH.
1st Vice President—HENRY TROTH.
2d Vice President—DR. GEO. B. WOOD.
Secretary—CHARLES ELLIS.
Treasurer—SAMUEL F. TROTH.
Corresponding Secretary—ELIAS DURAND.

Trustees.

DR. F. BACHE,
WM. W. MOORE,
AUGUSTINE DUHAMEL,
CLEMENT CRESSON,
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DR. R. BRIDGES,
AMBROSE SMITH,
HENRY W. WORTHINGTON.
(Elected for 6 months.)

WARDER MORRIS,
DR. JOSEPH CARSON,
EDWARD ROBERTS,
JOSEPH C. TURNPENNY,
DILLWYN PARRISH,
THOMAS H. POWERS,
WILLIAM PROCTER, Jr.
JACOB BIGONET.
(Elected for 12 months.)

Publishing Committee.

DR. JOSEPH CARSON,
CHARLES ELLIS,
DR. R. BRIDGES,
WILLIAM PROCTER, Jr.
DR. GEO. B. WOOD,
ELIAS DURAND,
AMBROSE SMITH,
AUGUSTINE DUHAMEL,
WILLIAM R. FISHER.
DR. BACHE.

On motion adjourned.

CHARLES ELLIS, *Secretary.*

MISCELLANY.

Upon the Therapeutic action of Compressed Air. By M. Tabarie. Extracted from a letter addressed to M. Arago. Translated by A. D. Chaloner, M. D.—Some time past M. Tabariè pointed out the resources which the methodical application of compressed air offers to medicine in the treatment of certain diseases, and especially in those which concern the organs of respiration. He now confirms his first observations, and makes known the results of the new investigations he has undertaken, always limiting himself to speak of the influence which the augmentation of pressure exercises upon all the constitution (bodily.) This influence appears to him to be characterised by two principal circumstances.

First—Condensed air reacts upon the circulation, by abating it, and at the same time that it diminishes the number of the pulsations of the heart, it regulates the *rythm* of them. These phenomena, which are scarcely perceptible in a normal state of health, become very obvious in cases of inflammatory or febrile diseases, when otherwise, the experimental conditions are fully answered, and sufficiently sustained.

Secondly—Condensed air does not influence the general temperature, as one richer in oxygen would do, for far from exalting this function, (as some have by analogy imagined,) it moderates, and, in certain cases, it even weakens it. Not only does the *balneum* of compressed air, really develope no unusual heat in the interior of the thorax, but on the contrary it tends to produce a general sensation of coldness, even when the temperature of the *preparation* is superior to that without; sometimes this sensation even increases with the duration, and the elevation of the degree of the *balneum*. The author attributes to this fact that the workmen who remain a long time, and at great pressure, under a diving bell, are compelled to leave on account of the coldness, which is not consistent with the temperature which surrounds them. In conclusion, he insists upon the necessity of exercising the compression in a gradual, uniform, and sustained manner, experience having shown him that sudden transitions accelerate and disturb the circulation of the blood, instead of moderating it, and increase in place of arresting the hæmorrhage.

Action of Sulphurous Acid on Hyponitrous Acid—Crystals in the Chambers of Lead—Theory of the formation of Sulphuric Acid. By M. F. DE LA PROVOSTAYE. Translated by same.—Notwithstanding the repeated attempts of chemists to determine the nature of the crystals in the chambers of lead, their composition is yet uncertain; some look upon them as a combination of nitrous and sulphuric acid and water; whilst M. Dumas, guided by numerous analogies, supposes that for their existence there is a direct combination of sulphuric and hyponitrous acids. M. de la Provostaye undertook to decide this important question; he has observed that sulphuric and hyponitrous acids (which have only now been made to re-act upon each other) combine together in producing a new compound, the more interesting, since it throws great light upon the crystals of the leaden chambers, and upon the theory of the formation of sulphuric acid.

This new substance dissolves in all proportions in hydrated sulphuric acid, and gives in very extended limits, crystallizable combinations. The crystals of the chambers of lead, which had been hitherto looked upon as identical, are really nothing but mixtures, in variable proportions, of this substance with anhydr and hydrated sulphuric acid, which explains the difference of the results of their analyses. Finally, the author admits that these crystals are never formed but under the influence of *anhydrous* or hydrated sulphuric acid; and that water, when it is free, always tends to decompose them.

New Method of Analysing Sulphurous Waters, and the re-action of Iodine with Sulphydric Acid—The Sulphydromètre. By M. ALPHONSE DUPASQUIER, Professor of Chemistry at Lyons. Extracted from the Annals of Chemistry and Physic. By A. D. CHALONER, M. D.—Having undertaken to write a full account of the fine institution which has been founded near the Allevard Spring, (Isère,) in the midst of the magnificent landscapes of the valley of Graisivandan, M. Dupasquier has occupied himself, carefully, with the analysis of the sulphurous waters which these springs abundantly supply. He has studied it thoroughly, and his investigations have led him to the discovery of a process as simple as curious; to recognise and prescribe the *exact* quantity of *free* or *combined* sulphydric acid in mineral waters. The tincture of iodine being poured into a fluid mixed with sulphydric acid, decomposes this acid entirely, and so instantaneously that it is very easy to ascertain the point where its decomposition is finished, and where the *iodine* combines no longer. Consequently, from this observation, which is peculiar to him, M. Dupasquier thought that in making use of a *Tincture of Iodine*, carefully prepared, he could from the quantity of Iodine employed to saturate a *litre* of sulphurous water, subtract the proportion of sulphydric acid, either free or combined, which it contains. This foreknowledge was confirmed by experience,

and the author has made his new method of analysis very convenient by means of an instrument which he has named the *sulphydromètre.* This instrument is a graduated tube, filled with the tincture of iodine, one of the ends is closed with a stopper, while the other is slender, and terminates by a capillary orifice, which permits the tincture of iodine to escape in drops from the time that the stopper is removed. To use the *sulphydromètre*, pour into a porcelain capsule a fixed quantity of sulphurous water to be analysed, add a few drops of the solution of very clear starch, then add the tincture of iodine gradually, taking care to assist the reaction by stirring the mixture with a glass rod. As long as any traces of the sulphydric acid remain, the iodine will carry off the hydrogen, by precipitating the sulphur, and disappear immediately without colouring the starch, but as soon as the saturation is completed the least trace of the *free* iodine is sufficient to give a beautiful blue colour to the solution.

Then count how many degrees the tincture has disappeared in the *sulphydromètre*—of which each degree is equal to *one centigramme* of iodine, and each tenth of a degree, one *milligramme.* The quantity of iodine requisite to saturate a *litre* full of sulphurous water, being given, it is very easy to find how much *sulphydric acid* this *litre* of water contained, by determining the equivalent of the iodine in hydrogen. The volume of this hydrogen being known, we have that of the sulphydric acid, which is exactly the same. To render the use of this instrument more convenient, the author has made a table which indicates in weight and in volume the quantity of sulphydric acid, represented by 1, 2, 3, &c. 100 *centigrammes*, 1, 2, 3, &c. 100 *milligrammes.*

This method of analysis, independently of giving results of a rigorous exactitude, has the advantage of being so quickly performed that fifteen or twenty experiments can be made in less than an hour. It is also so extremely simple, that it does not require a chemist to determine the proportion of sulphydric acid contained in a mineral water; any intelligent person can each day observe the precise variations in the strength of the sulphurous waters, either by atmospheric influence or the mixture of water. Among other advantages this method possesses, M. Dupasquier shows its sensibility, which is so great that it indicates the precise quantities of sulphydric acid in those waters upon which other reagents produce no effect, while they evidently show a sulphurous character. The tincture of iodine really càn (he assures us) disclose in a decided manner a *drop* of a concentrated solution of an *alkaline sulphydrate*, poured into a *hecto litre* of water, while the known reagents become powerless if they are merely poured into ten *litres* of water.

Preparation and Employment of the Sesqui-Ioduret of Iron.—M. OBERDOERFFER, a pharmaceutist of Hamburgh, gives the following formula for

the preparation of this salt, which he says may be preserved a long time without decomposing:—Mix in a glass vessel half an ounce of iodine, a drachm and a half of iron filings and an ounce of water; when the reaction is completed, the mixture is to be slightly shaken until it becomes of a clear green color, due to the ioduret of iron. Then dilute it with four ounces of water, filter and also pass some water through the filter. Afterwards add to the solution two drachms of iodine, which is readily and quickly dissolved. A deep reddish brown liquid results, to which a sufficient quantity of water is added to make the weight of the whole ten ounces. Each drachm contains about four grains and a half of iodine. This preparation has been long employed at the General Hospital, Hamburgh; its effects are the same as those of the ioduret of iron; it must be given internally, however, in smaller doses. The best form for its administration is in syrup.—*Zeitschrift für die gesammte Médicin*, June, 1840.

In our number for February last, (p. 449,) we gave a formula for a syrup of ioduret of iron, which, from considerable experience, we can recommend as a most valuable preparation. It can be preserved for a long time without becoming decomposed, and produces the best effects of the two articles which enter into its composition. The comparative value of this and the sesqui-ioduret must be decided by future experience.—*Am. Journ. Med. Sciences.*

Socotrine Aloes.—"This plant (the aloe) has rendered Socotra famous from the earliest period. It is found growing on the sides and summits of the limestone mountains, at an elevation of from 500 to 3000 feet above the level of the plains. The plant appears to thrive only in parched and barren places; its leaves are plucked at any period, and, after being placed in a skin, the juice is suffered to exude from them. This is afterwards carried principally to Muscat, where the price varies according to the quality, from two to four shillings the English pound. Socotrine aloes, if care were taken in collecting them, would be the finest in the world; but this is not the case, and their value becomes proportionably deteriorated.

"When the authority of the sultans of Kisseen was better acknowledged than at present, they monopolized the whole produce of the island; and stone walls, dividing its surface into separate portions, were carried with immense labor over hill and dale. These still remain, but now any one collects the plant, when or where he thinks proper, and this they only care to do when the arrival of a ship or buggalo creates a demand. Every part of the island affords this useful plant, but more especially the western, where the surface is thickly covered for miles. In 1833, only two tons were exported."—*Ibid. from Wellsted's Tour on the Island of Socotra.*

Dragon's Blood.—"The trees of this are not usually met with at a less elevation than 800 feet, and they frequently occur as high as 3000 feet above the level of the sea. The trunk, at the height of six feet from the

ground, varies from twelve to eighteen inches in diameter, and its height is from ten to twenty feet. The gum exudes spontaneously from the tree, and it does not appear usual on any occasion to make incisions in order to procure it. Two kinds were shown me; one of a dark crimson color, called *moselle*, is esteemed the best, and its price at Muscat is from six to eight rupees, the Bengal seers. I was frequently assured, that not one-tenth of the quantity which might be procured was ever collected by the Bedowins. As with the aloes, this appears to be consequent on there being no regular demand."—*Ibid.* T. R. B.

Ointment for Itch.—Dr. De la Harpe, chief physician of the Hospital of Lausanne, gives in the *Gazette Medicale de Paris* (July, 1840,) the following formula for an ointment which he says he has very successfully employed in the treatment of upwards of 400 patients. Flowers of sulphur 16 parts, sulphate of zinc 2 parts, powder of white hellebore 4 parts, soft soap 31 parts, lard 62 parts.

The mean duration of treatment with this ointment was in 1836 eighteen, in 1837 fifteen, in 1838 eleven, and in 1839 ten days.—*Am. Journ. of Med. Scien.*

New Theory of the Galvanisation of Metals. By W. Schœnbein.—Iron, zinc, and copper, are oxidized in the air, in water, and in saline solutions, as well as when they are in contact with other metals, or attached to the poles of a galvanic pile, as when they are isolated. But if a current is established, however feeble, the metals which form or are connected with the negative pole which receives the hydrogen are not attached. It follows from this, that the protection of copper by iron, as in the experiments of Davy, is due to a chemical decomposition of the water which occurs, however feeble the chemical action. It results from my experiments:

1st. That neither ordinary or voltaic electricity are capable of modifying the chemical properties of bodies, and consequently that the electro-chemical theory of Davy and of Berzelius cannot be admitted.

2nd. That the modifications which occur in the chemical properties of certain bodies when they are under the influence of contact, are due to the production of some substance, and its deposition on these bodies by the action of the electric current.

3d. That the surest manner of protecting certain oxidizable metals from the action of free oxygen dissolved in water, is to place them in a voltaic current composed of the metal in question and one that is more oxidizable, both being in an *electrolytique* liquid, such as water which contains hydrogen.

Combinations of Ammonia with Metallic Oxides.—A series of these compounds has been described by M. O. Rammelsberg in the Ann. de Pog. t.

48. By dissolving Iodide of Zinc in a solution Ammonia and allowing the mixture to evaporate spontaneously, brilliant prismatic crystals were obtained, which were permanent in the air, but rapidly decomposed when treated with cold water. The formula of this combination is ZnI^2+4NH^3.

When dry Iodide of Zinc was treated with gaseous Ammonia, a combination is obtained which contains a large proportion of Ammonia. Its formula is ZnI^2+6NH^3. It is also rapidly decomposed by water.

Iodide of Cadmium, by similar treatment with Ammonia, produces compounds of which the formula are CaI^2+2NH^3 and CaI^2+6NH^3.

Compounds may be formed with Iodide of Cobalt and Ammonia, which consist of CoI^2+4NH^3 and CoI^3+6NH^3.

When Ammonia is added to a solution of Iodide of Nickel, a blue precipitate is formed which entirely dissolves on warming the liquor, from which, on cooling, it crystallizes in small crystals. These consist of NiI^2+6NH^3.

A compound may also be obtained of the Biodide of Copper and Ammonia. *Ann. des Mines.*

Researches on the Composition of Crystallized Phosphoric Acid. By M. Peligot.—Having kept for some time phosphoric acid of a syrupy consistence in stopped bottles, it formed two beds of crystals; the superior, transparent and hard; the inferior, of the consistence of candied honey. On analysing them separately, after drying, I found 0.27 to 0.28 water in the former, and 0.22 to 0.23 on the second; the hydrate with three equivalents should contain 0.274, and with two equivalents 0.201. It is known that glacial phosphoric acid contains only one equivalent. The supposition of M. Graham on the existence of two hydrates is thus confirmed.

Double Nitrate of Potassa and Soda. By M. Loole.—By dissolving with heat equal parts of the nitrates of potassa and soda, in three parts of water, and cooling the liquor gradually, crystals of the double salt were formed half an inch long, in radiated groups, and having a silky lustre.

Protection of Iron by Zinc. By M. Munckel.—M. de Althaus, director of the salt works of Durheim, has succeeded in completely protecting the pans, thirty feet long, which are used for evaporating brine, by riveting to their exterior bands of zinc; and he has remarked that it was not necessary that the metals should be polished at the points of contact. This fact, which is established by an experience of more than ten years, tends to support the theory of contact. *Ann. des Mines.*

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*Mr. Donovan on Cod-Oil.**—It appears that cod-oil has been a good deal used, of late, in France and Germany, in certain scrofulous cases. They

* Dublin Journal, July 1, 1840.

say that when properly administered, cod-oil cures scrofula of the bones, marasmus, and chronic arthritis of a scrofulous or rheumatic form. Caries, accompanied by a sore and swelling of the soft parts, requires the treatment with oil to be seconded by local applications, such as compression, and ioduretted alcoholic fomentations; cod-oil is of no avail against gouty arthritis, or swelling of any lymphatic glands but those of the abdominal cavity; its action seems doubtful or null in scrofulous phthisis when at all advanced. To produce advantageous results, in any disease, the use of cod-oil must be persevered in for several months, in doses of three or four table-spoonsful daily.

Now, if this be all true, cod-oil is no bad thing, and it would be well to have it as good as can be got. Perhaps it should *not* taste exactly like train-oil, as that might make one sick, if it did nothing else. So Mr. Donovan has perfected the process for its preparation, and made cod-oil a very respectable oil to take.

Take, says he, any quantity of livers of cod, throw them into a very clean iron pot, and place it on a slow fire, stir them continually until they break down into a kind of pulp: water and oil will have separated. When a thermometer plunged in the pulp will have risen to 192°, the pot should be taken from the fire, its contents transferred to a canvass bag, and a vessel placed underneath. Oil and some water will run through. After twenty-four hours, separate the former by decantation, and filter it through paper.

The oil, thus prepared, is of a pale yellow colour; its smell is weak, and resembles that of a cod boiled for the table when in excellent condition. Its taste is bland, by no means disagreeable, and, as might be expected, is totally free from rancidity. It is very liquid. Its specific gravity in my trials was 0.934, although in all the published tables of specific gravities it is stated to be 0.923. In cold weather it deposits much stearine, and this ought not to be separated.

The product of pure oil is very variable. He has obtained so much as a gallon (wine measure) from twenty-eight pounds of livers, the produce of fifty cods. Sometimes the livers will afford much less. The runnings of the first heat only should be used: a second heat will supply more oil, but it will be comparatively strong-smelling, ill-tasted, and deep-coloured. The above estimate is true only when the fish is in the best season, and fully grown. Towards the close of the season the produce will be less. The livers of some cods are flaccid and lie flat without plumpness on a plane surface. These afford a deficient quantity of oil, a brown, strong-smelling quality, and a large portion of brown water; they are totally unfit for use, and their oil is disgusting. The livers are often found diseased and dark-coloured; such afford a very bad oil, and are of course to be rejected.

On the west coast of Ireland they consider the beginning of the year the best season, and on the east the month of November for the cod-livers. Thus, concludes Mr. Donovan, in preparing cod-oil fit for medical purposes, three chief things are to be attended to: the livers must be perfectly healthy; they must be as fresh as possible, the least putrescency being injurious; and the heat at which the extrusion of the oil is effected must not exceed 192°. *Med. Examiner.*

On Artificial Nipples of Ivory.—The following remarks are from a report of Messrs. Dubois, Capuron, and Villeneuve—three of the most distinguished accoucheurs of Paris—on the artificial nipples recently invented by M. Charriere, an ingenious cutler of the metropolis.

"In the construction of these nipples he uses ivory, which has already been made soft and flexible by a process that has been long known: they are more solid and more durable than those hitherto employed. They are sufficiently resisting not to be flattened by the lips of the infant, and yet not too hard to fret and inconvenience them. They are easily kept clean by merely shaking them about in water, and with this simple precaution it will be found that they are not apt to communicate any unpleasant smell or taste to the milk. Besides, they can be readily attached to any sort of sucking dish or bottle, if the child is brought up by the hand and not suckled by the mother.

To preserve the flexibility of the prepared ivory, all that is necessary is to keep it from the contact of the air by placing the nipple under a glass, or by wrapping it round with a damp cloth. In fact we (the reporters) think highly of these new contrivances, and already, we are told, they are extensively used both in public establishments and in private practice."

(We have observed in some of the recent French journals, that the prepared flexible-made ivory has been manufactured into bougies for the male urethra; but whether they possess any peculiar advantages we do not know.

Excellent artificial nipples are now made with prepared caoutchouc: they are entirely destitute of any unpleasant smell or taste, and have quite a fleshy feel to the lips when sucked with.)

Med. Examiner, from Med. Chirurg. Review.

THE

AMERICAN JOURNAL

OF

PHARMACY.

PUBLISHED BY AUTHORITY

The Philadelphia College of

EDITED BY

JOSEPH CARSON, M.

Professor of Materia Medica and Pharmacy

AND

ROBERT BRIDGES, M.D.

ASSISTED BY A PUBLISHING COMMITT

CONSISTING OF AMBROSE SMITH, WM. R. FISHE

ELLIS, PROFESSOR WOOD, PROFESSOR

AUGUSTINE DUHAMEL, WM. PROCTE

AND ELIAS DURAND.

VOL. VI.—NO.

NEW SERIES.

JULY,

PHILADELPHIA:

MERRIHEW AND THOMPSON, PRINTERS, NO. VII. CARTER'S ALL

Price $2 50 a year, in advance.

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THE

AMERICAN JOURNAL

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PHARMACY.

JULY, 1841.

ARTICLE XIX.—FURTHER REMARKS ON THE AMMONIO-IODIDES OF MERCURY. By Ambrose Smith.

In a paper on the hydrargyro-biniodides of potassium, &c., published in No. 4, vol. vi, of this Journal, I included a notice of a compound of ammonia and biniodide of mercury. A number of the Ann. des Mines, received since that paper was printed, contains an article by M. O. Rammelsberg, extracted from Poggendorf's Annalen, in which he gives the result of his observations on this subject.

The white compound, formed by adding aqua ammoniæ to biniodide of mercury in solution, or by exposing the biniodide to the action of gaseous ammonia, he finds to consist, as stated in my former paper, of ammonia and biniodide of mercury; and its constitution he gives as $2HgI^2+N^2H^6$, (or HgI^2+NH^3.) The formula which my experiments indicated is, HgI^2+2HN^3, and this agrees with Rose's analysis of the same compound. Adopting Kane's views of the proximate composition of ammonia, the formula would be $HgI^2+2(H.HN^2.)$

The yellow salt into which it is converted by the limited action of water, does not appear to have been noticed by him.

On forming the white compound, by treating biniodide of

mercury with aqua ammoniæ with the aid of heat, a small proportion of residue is left undissolved. This I did not examine particularly, supposing it to be HgI, deposited because the biniodide did not contain the full proportion of iodine, (which is usually the case,) together with a little adherent HgI^2. According to M. Rammelsberg's observations, it is a compound analogous in its composition to that which is produced when white precipitate is decomposed by washing with water or an alkaline solution; that is, it consists of biniodide of mercury, oxide of mercury, and amidet of mercury. As the subject is interesting from its connection with the theory of amidogen and the amidets, and, by analogy, with the composition of white precipitate, I present an abstract of M. Rammelsberg's observations upon it from the Ann. des Mines, not having access to the original paper.

When biniodide of mercury was warmed with aqua ammoniæ, he found a complex action to occur. Besides the combination of biniodide of mercury and ammonia, which dissolves, a white substance is formed which soon becomes brownish, and finally takes the color of kermes, without undergoing further alteration by prolonged boiling. This brown compound does not correspond with white precipitate, but with the product which results when the latter is decomposed by water or the alkalies, that is to say, it is formed of HgI^2, HgO, and $HgHN^2$.

In order that a product of this kind should be formed by this reaction, hydriodic acid must be produced; and this M. R. has found to be the case.

To obtain this brown compound in a state of purity, the supernatent liquid must be rapidly poured off while it is yet warm, and the residue boiled again with aqua ammoniæ, and thus repeatedly until no more is dissolved.

This compound has a brown, sometimes a purple color. It is inalterable in the air, and may even be heated to 180° without decomposition. It does not disengage the least trace of ammonia when boiled with a solution of potassa. Judging from the results of its analysis, and the nature of the reaction which

produces it, its formula appears to be $HgI^2 + 2\dot{Hg} + HgN^2H^4$, (or $HgI^2 + 2\dot{Hg} + Hg2NH^2$.)

The formula of the iodine compound, corresponding to white precipitate, should be $HgI^2 + Hg2NH^2$, but it does not appear that this product can be obtained.

M. Rammelsberg has also made some researches on the action of ammonia on the protiodide of mercury. He found that when this substance was digested in aqua ammoniæ, at the ordinary temperature, a black powder was formed, which was the ammoniacal protiodide. The evanescent nature of this compound, together with the facility with which the protiodide itself is decomposed, renders it very difficult to analyse; by drying alone it loses all its ammonia. If the protiodide is boiled with solution of ammonia, a black precipitate is produced which contains much metallic mercury, and the liquor, on cooling, deposites white crystals of the ammonio-biniodide.

ART. XX.—REAGENTS AND THEIR USES.

By Augustine Duhamel.

REAGENT.

Under this title is included all those nice chemical preparations indispensably necessary for the use of the analytic chemist as tests. These, from the degree of purity demanded, have heretofore been required to be imported from distinguished French houses, such as Robiquet, Pelletier and others, but of late this necessity has been saved us by the advanced state of chemistry in this country, and the existence here of laboratories that have acquired general confidence where-ever known by the excellence of their products. Their preparation, however, is not confined to manufacturing chemists, as some of the Cabinets of Reactives, belonging to our Professors, have been supplied by the skill of a number of our apothecaries. These latter, who give any attention to this important branch, are so few in number that an experimental chemist is often at a loss to procure such of them as he may wish, out of two or three principal cities.

Many, styling themselves "Apothecary and Chemist," limit their stock of chemicals to such substances as belong exclusively to the Materia Medica, and thereby neglect the advantage that would accrue to them did they devote but a little attention to keeping on hand supplies of such pure chemical tests as are most needful in a chemical laboratory.

The following substances, which should be pure, comprise those most commonly used for analyses of minerals, mineral waters, &c. The use to which these substances are applied is likewise indicated, which may not be without interest to many.

Boracic Acid, used to discover small quantities of phosphoric acid in minerals.

Hydrochloric Acid, for dissolving oxides, separating them from their compounds,—and precipitating silver.

Sulphuret of Antimony, or *Protosulphuret of Iron*, for making *Hydrosulphuric Acid*, used in organic analyses to obtain and separate the organic acids from the insoluble compounds formed with protoxide of lead.

Nitric Acid.—As a solvent of metals, separating their alloys, decomposing the phosphates and tartrates, and detecting the presence of ammonia, &c.

Oxalic Acid, for precipitating lime, &c.

Distilled Sulphuric Acid, for decomposing neutral salts, detecting lead in vinegars, and discovering baryta in mineral waters.

Sulphurous Acid, for precipitating sulphur from sulphuretted hydrogen, &c.

Lime Water, for detecting carbonic acid, &c.

Aqua Ammonia, to precipitate metallic oxides from their solutions, or to redissolve the soluble, and separate from the insoluble oxides—also to precipitate vegetable alkaloids.

Watery Solution of Baryta, for detecting sulphuric acid, and ascertaining its proportion, &c.

Carb. Potassa, to test lime water, and precipitate metallic oxides from the sulphates, and earths from the muriates.

Chloride of Barium, for detecting the presence of sulphates in mineral waters.

Pure Potassa and Strontia, in the dry state for decomposing salts of earthy or metallic bases by calcination.

Solution of Pure Potassa, for a multitude of operations.

Prussiate of Potash, for detecting iron in solutions, and the presence of copper in mineral waters.

Nitrate of Silver, for detecting hydrochloric acid, and to show the présence of muriates and sulphates in solutions.

Hydrosulphate of Ammonia detects many of the metals, and separates them from alkaline and earthy salts.

Nitrate of Mercury discovers the carbonates of lime, soda,

and magnesia, as well as sulphuric and hydrochloric acids. Used to precipitate chromic acid.

Deutoxide of Copper, for decomposing vegetable and animal matters, and determining the elementary composition of immediate principles: their proportion of hydrogen and carbon.

Acetate and Sub-Acetate of Lead, to detect hydrosulphuric acid in gases or mineral waters, and to precipitate acids and coloring matter from organic substances.

Oxalate of Ammonia, used in mineral analyses to separate the lime and estimate its weight, by the quantity of oxalate of lime formed after the ammonia is driven off by heat.

Deuto-chloride of Platina, to discover potash, ammonia and their salts, in concentrated solutions.

Deuto-chloride of Gold, to discover tin in solution.

Iodide of Potassium, to distinguish metallic solutions from one another, such as lead, mercury, silver, bismuth, platina, &c.

Bi-carb. Potassa, to separate magnesia from its solutions, &c.

Sulphate of Soda, to precipitate from their acid solutions, the oxides of barium, strontium, and lead.

Succinate of Ammonia, to separate peroxide of iron from other metallic oxides which form with succinic acid salts, soluble, or partially so, in water.

Gelatine, for precipitating tannin.

Tincture of Galls, for detecting iron.

Tincture of Iodine, to detect starch.

Tincture of Litmus, for detecting the presence of acids.

Chloride of Calcium, for drying gases.

Nitrate of Potash, *Bi-borate of Soda*, *Phosphate of Soda and Ammonia*, and *Carbonate of Soda*, as fluxes.

Turmeric and *Litmus* papers, *Starch*, *&c.*

The saturated solutions of the above mentioned substances, when kept, should be always preserved in glass stop vials.

With these articles might also be included, a small stock of

white glass tubes, rods, retorts, matrasses, test glasses, adapters, gas receivers, florence flasks, porcelain, capsules and funnels, together with a blowpipe and platina crucible, without which a laboratory would be incomplete.

ART. XXI.—NOTE UPON THE ETHERIAL OIL OF ERGOT.

By Augustine Duhamel.

The January number of the Journal of Pharmacy contains an article upon the oil of ergot, taken from the Edinburgh Med. and Surg. Jour., in which two methods are referred to for obtaining it. Having, at the time of perusing this publication, an order to procure the oil for the use of some Practitioners of Homœpathy, and desirous of testing the nature of the product afforded by the ethereal process, an experiment was made with the following result.

One pound of ergot in fine powder was put into a displacement filter, and treated with successive portions of sulphuric ether, amounting in all to half a gallon. To prevent the evaporation of the ether, the filter was covered over with a wetted bladder. When the whole of the tincture had passed, which was of a reddish yellow color, it was placed over a water bath, and heat applied until no more ether remained. The product measured six ounces, and consisted of a fixed, viscous, reddish brown, transparent oil. Previous to the ether being wholly evaporated, there appeared to be two oils, the supernatent one being a thick, blackish oil, the other a much less colored, but heavier oil. The temperature of the bath, however, caused them to blend together as the ether parted from them.

Upon testing some of its properties the following facts were elicited. Its taste was precisely similar to castor oil, leaving a slight acridity: odor faint, resembling ergot; spec. grav. .869.

It had no action upon litmus. Subjected to heat, it gave off, while boiling, a thick white smoke and a fatty odor, and was gradually dissipated, leaving behind a slight carbonaceous residue. Allowed to repose for twenty-four hours, at a common temperature, a notable proportion of stearine (or rather *margarine*, a name assigned by Lecanu to the solid principle analogous to stearine, derived from vegetable substances,) was deposited ,and the oil assumed a darker hue.

Its color was mainly owing to the resin, and some of the coloring matter dissolved by the ether; for upon washing it with alcohol, it was in a great measure deprived of color and spissitude.

It is very soluble in ether, sparingly soluble in alcohol of 35°, completely dissolves in a large proportion of boiling alcohol, but, upon cooling, some of the oil separates and subsides. Water added to the solution of the oil in alcohol, renders it very milky, and separates some white fatty matter which floats upon the surface.

With concentrated solutions of potash, soda, and ammonia it saponifies readily. In addition to the medicinal qualities assigned to ergot in substance, this oil possesses the property of a styptic, having, as it is said, the quality of arresting hæmorrhage in an eminent degree.

After exhausting the ergot of its ethereal tincture, by means of water thrown upon the filter, there passed a transparent liquid of an intensely dark red color, without smell or taste, beyond that of the ether with which it had been contaminated. It possessed the following characters: It combined with water in every proportion, was not miscible with ether, and alcohol threw down a precipitate. It was discolored by chlorine, and likewise by dilute sulphuric acid; while caustic potash had the effect of deepening its color. Sub. acet. plumbi threw down a copious precipitate. Sulph. Ferri changed it to a turbid purple.

From these experiments, we may judge this latter substance to have been simply red coloring matter combined with gum.

ART. XXII.—ON THE IODIDES OF ARSENIC.

By HENRY F. FISH.

IN the Journal of Pharmacy for October, 1840, (which, owing to an accident, did not reach me in the country until the last day of March, 1841,) I notice a few remarks upon *Iodide of Arsenic*, in a series of notices communicated by Mr. Augustine Duhamel.

As Mr. Duhamel's notice of this salt, and its mode of preparation, is not 'sufficiently minute *in detail*, and as the tyro in chemical manipulation may be gratified by a few practical details, I have concluded to submit the following paper.

There are *two* iodides of arsenic. The first is a *sesqu-iodide*, consisting of

Arsenic,	2 equivalents.
Iodine,	3 "

The second is a *Duo-semi quiodide*, (or per-iodide, as it is common to say,) consisting of

Arsenic,	2 equiv.
Iodine,	5 "

My first essay in the preparation of these iodides was made in December, 1838. I had not, at that time, seen M. Plisson's paper upon the discovery and manufacture of the sesqu-iodide; and my only information was gained from Thomson's Chemistry.

I proceeded, however, using the *moist way*, with

Pure arsenic,	ʒvj.
Iodine,	ʒxx.
Distilled water,	℥xxv.

From my notes made at the time I copy as follows:—"Reduce the arsenic to a fine powder, put it into a suitable glass flask, and moisten it with a small portion of water, agitating it until it is completely wet; then add the residue of the water and the iodine. Digest, by slow heat, until ebullition ensues. Immediately after boiling, the solution changes from a dull grayish-black color, to a very light reddish hue, and the smell of iodine becomes extinct. Combination being thus insured, filter the solution while hot, and evaporate slowly in a porcelain dish. At a certain degree of concentration, a metallic pellicle forms upon the surface, covering it entirely, which, when agitated with a glass rod, is precipitated, forming a semi-crystalline mass. This is the sesqu'iodide of arsenic, but not in a state of absolute purity. Continue the evaporation, and dry the mass, constantly agitating it with a glass rod, to prevent its splashing out of the dish, and its consequent loss. *When dry*, the crystals are to be put into a well adapted capsule, of platina, or Berlin porcelain, and fused."

The fusion should be conducted with skill and rapidity. It is decidedly preferable to raise the heat at once, than to prolong the process by gradual degrees of augmentation, as the salt is not only readily vaporised, but decomposed, during fusion. When fusion is complete, the liquid salt should be instantly poured upon a marble slab and allowed to cool.

During fusion, copious orange-colored vapors are generated, which are abundantly irritating to the eyes and fauces; and I would suggest the greatest caution against their inhalation.

If the process has been skilfully conducted, the fractured mass will present, at its edges, a crystalline appearance, the structure of which is lamellated. Externally, it has a dull metallic lustre, of a brick red color, not unlike some specimens of deut-oxide of mercury of inferior quality.

It should be preserved in glass-stopt vials. The same process, with the addition of another equivalent of iodine, insures the production of the *duo-semi, (alias per,) iodide of arsenic.* The fusion of this latter iodide requires nicer management of heat, and, on account of its greater capacity for vaporisation, this should be still more rapidly conducted. The same phenomena attend its progress, and it differs in its physical aspect from the sesqu'iodide only in color, which is two or three shades darker. Perhaps a *slight* excess of iodine is preferable during combination, to avoid any risk of free arsenic being retained in the solution.

Although M. Plisson has, (as far as my knowledge extends,) announced but one iodide of arsenic, there can be no doubt of the existence of another, as I have proved by both synthesis and analysis.

These iodides are positive elementary compounds, containing no equivalent of water. When exposed to the action of light and air, they gradually attract moisture, but I have not noticed any sensible change of color. They are vaporisable at the ordinary temperature to some extent; and if the exposure is sufficiently prolonged, they entirely disappear.

When treated with water in quantities too small to effect solution, they are decomposed:—Iodo-hydric, and arsenious acids are formed, mingled with undecomposed portions of the salt.

In water sufficient to effect the solution, the sesqu'iodide is, according to M. Plisson, converted into a *neutral hydriodate;* "although," says he, "the liquor reddens violently the color of tournesol;"—an action which he attributes to the *weak saturating properties* of the arsenious acid.

These iodides may be prepared by bringing the dry elements into contact, in a suitable flask, or tube, and applying heat. They are easily sublimed during the process, but there is invariably a greater or less degree of decomposition attending this mode. The *moist way* is not only the safest, but decidedly the best mode; and its use is preferred by M. Plis-

son himself. It certainly insures a more perfect product, at a slight addition of labor.

The formula for the sesquiodide is

$\underline{As}I^3$, and its atomic weight 454

For the duo-semi qu'iodide,

$\underline{As}I^5$, atomic weight 706

With the powers of these iodides, as remedial agents, I am unacquainted.

In the *Annales de Chimie et de Physique*, No. 39. pp 265, 274, may be found an elaborate paper upon the composition and analysis of the sesqu'iodide of arsenic, by M. Plisson; to which, I would refer all those who may require more minute details upon these topics.

New York, 22d May, 1841.

ART. XXIII.—PHARMACEUTICAL NOTICES. No. XIX.

By Augustine Duhamel.

Remarks upon Citrine Ointment.

The difficulty of preserving, when made, the proper consistence and fine yellow color of this ointment, led Mr. Wm. R. Fisher, some ten years ago, to abandon the formula recommended by the U. S., Lond., Dub., and Ed. Colleges, and substitute another; the successful result of some experiments made by himself upon various fatty matters, united with nitrate of mercury in solutiou. This formula, to which he gave a preference, consisted in employing neatsfoot oil mixed with a small quantity of lard, in lieu of variable proportions of lard and olive oil, prescribed by the different Colleges, and still retained by the three last mentioned. The neatsfoot oil Mr. F. found to realize his wishes, in regard to durability of color, consistence, &c.

At that period, the hardness of the citrine ointment, as made in the common way, was attributed to the action of the nitrate upon the lard, but this has since proved erroneous, by the more extended experiments of chemists upon the composition of fatty matters generally, from which we learn that this solidity is due to the reaction of the nitrate of mercury upon the peculiar *oleine* of the olive oil. In fact, this solidification is so characteristic, as to establish the nitrate of mercury as a test for recognizing the degree of purity of olive oil.

While this solidification takes place with olive and some other vegetable fixed oils, it does not occur with the greater part of the animal oils. The object of this notice is to sustain an already expressed opinion, that other animal oils may supply the place of neatsfoot oil without any disadvantage, especially as the last is not so readily obtained as hog's lard. Inasmuch as a portion of lard is directed to be mixed with the

neatsfoot oil, why would it not be as easy, or preferable to use all lard, if, by so doing, the same intention is fulfilled? That it is so, I would wish the pharmaceutic public to judge from the following:

Dr. Duncan, of Edinburg, states in his Dispensatory, that with lard alone he prepared an ointment which retained the required color and consistence. To this fact I would give additional strength, by stating that for four or five years past I have sought no other vehicle for making the ointment of nitrate of mercury than butcher's lard. My method of proceeding is first to prepare my solution of proto-nitrate, without heat; then melt the lard over a common fire in a metallic vessel, and transfer it to one of porcelain, (ointment jar.) This being done, I pour gradually the solution into the heated grease, (140° F.,) and commence stirring the mixture, while hot, with a wooden spatula for about ten minutes, which has the effect of increasing the temperature of the mixture some 20° or 30°, and causing the escape of hyponitric acid vapors. I then set it aside to cool. If the stirring be prolonged, a violent effervescence takes place, which may cause the mixture to overflow—and likewise renders it darker in color.

Citrine ointment prepared in the manner here mentioned, differs from the one made with olive oil and lard, in being of an orange, instead of a lemon yellow color. It is of good consistence, perfectly homogenous, and retains these characters through summer and winter, without acquiring the mottled appearance of the other.

Hypo-Sulphite of Soda.

This is a chemical agent of some importance to those practising the Daguerreotype art, being used in the form of a weak solution to wash off the superfluous iodine from the plate, after the object is depicted upon it. It is made by dissolving two pounds of subcarb. sodæ in three and a half pounds of water, into which is thrown four ounces of flowers of sulphur, stirred in six ounces of water. A current of sulphurous acid gas, obtained from the decomposition of ten pounds of

sulphuric acid, by four pounds of mercury, is made to pass through this solution. When the reaction is complete, filter the liquid and evaporate slowly, so as to crystallize. Decant the mother waters, dry the crystals between folds of bibulous paper, and preserve in glass stop vials. The apparatus in which it is most conveniently made, consists of a matrass in which the acid is formed, to the neck of which is adapted two tubes, (an S and a connecting tube,) and a couple of Wolf bottles; one containing the water to wash the gas, and the other the saline liquor. The last should be provided with a tube, terminating in a solution of lime, to carry off the excess of acid.

Another and more simple method, according to Berzelius, consists in exposing to the air a concentrated solution of sulphuret of sodium, which gradually becomes oxidized.

Hyposulphite of soda crystallizes in tetrahedral prisms, which are colorless, transparent, and at times of large size. Some lately exhibited at the laboratory of Messrs. Rosengarten and Denis were remarkable for their transparency and volume.

Chloride of Gold.

This is another preparation used in the Daguerreotype, and is employed in very minute portions to give color as well as fixedness to the image represented upon the plate, which otherwise would be effaced by the slightest touch. To give the proper color and effect, it is absolutely necessary that the gold should be free from the contamination of other metals. For this purpose no better means offer than the following:

Dissolve gold coin in nitromuriatic acid, then evaporate to dryness and subject it to a red heat; afterwards pour upon it sufficient nitric acid to dissolve out all the alloy contained in the gold coin: filter, and again dissolve in aqua regia, in the proportion of one part pure gold to three parts of acid, (formed of pure acids.)

Effect the solution in a porcelain capsule upon a sand bath,

then evaporate to dryness, at a gentle heat, to drive off the excess of acid. Dissolve the mass in water, filter, and again evaporate till a pellicle is formed. By cooling, the salt crystallizes. Being very deliquescent, it should be preserved in glass stop vials; or, what is better, dissolved in a certain quantity of distilled water, (say ℨi to ℥i,) in order that you may conveniently dose your gold in further diluting it for use.

Formulæ.

For the gratification of some of our distant friends, who have not the same advantages that the apothecaries of large cities possess, of being able to refer to foreign works or formularies, we commence the publication of a series of formulæ, embracing such as are generally employed and called for by English, German, or French physicians practising medicine in this country.

Catechu Lozenges—(Paris Codex.)

Powd. Ext. Catechu,	1 part.
Powd. White Sugar,	4 parts.
Mucilage of Gum Tragacanth,	q. s.

For lozenges weighing 12 grs.
Dose from 3 to 10 a-day. For sore throat, &c.

Van Swieten's Liquor—(Codex.)

Corrosive sublimate,	gr. viij.
Distilled water,	℥xivss.
Alcohol,	℥iss.

Dose from 2 to 8 drachms progressively, in 4 ounces of mucilaginous vehicle. Each drachm contains $\frac{1}{16}$th of a grain of corros. sub.

Oil of Phosphorus—(Magendie.)

Phosphorus,	ℨj.
Oil of Sweet Almonds,	℥ij.

Dissolve, and add a few drops of oil of bergamot.
Dose from 20 to 30 drops in an emulsion.

Protiodide of Mercury Pills—(Biett.)

Protiodide of Mercury,	℈ij.
Powd. G. Guaiac,	ʒj.
Thridace,	℥ss.

Mix, and divide into 48 pills.

Dose 1 per day. For scrofula, syphilis, &c.

Lactate of Iron Lozenges.

Lactate of Iron,	2 or 4 oz.
Sugar,	1 lb.
Mucilage of Tragacanth,	q. s.

For lozenges weighing 10 grains.

These lozenges have proved to be the best form of administering this new chalybeate.

Sulphuric Lemonade—(Paris Hospitals.)

Sulphuric Acid,	ʒss.
Simple Syrup,	℥iv.
Water,	℔ iv.

As a drink in fevers, colica pictonum, &c.

Dinner Pills,

Otherwise called Stomachic or Lady Webster Pills.

Aloes, in powder,	ʒvj.
Red Roses, "	ʒij.
Gum Mastic "	ʒij
Syrup of Wormwood,	q. s.

Make a mass, and divide into pills of 3 grains.

Sulphur Bath—(Paris Hospitals.)

Sulphuret of Potash,	4 oz.
Water,	200 ℔.

For a bath in cutaneous diseases. Sometimes this is rendered gelatinous, to imitate the *Barege Water*, by the addition of 2 pounds of glue dissolved in hot water.

Oil of Hyosciamus and Oil of St. John's Wort.

These are preparations frequently called for in this country, and are made by decoction. The first, by boiling one part of henbane leaves with four parts of olive oil, and allowing it to macerate several hours before straining. It is of a green color, and used for frictions to calm pain. The latter is made in the same way, with one part of the summits of hypericum, and two parts of olive oil. It is of a fine red color, and used for sprains and bruises.

ART. XXIV.—SELECTIONS FROM LASSAIGNE'S DICTIONNAIRE DES REACTIFS.—No. 2.

Translated by AUGUSTINE DUHAMEL.

Commercial Hydrochloric Acid.

THIS acid, which is manufactured on a large scale, is commonly colored yellow, as met with in commerce. This is owing either to a small quantity of decomposed organic matter, or to a certain quantity of perchloride of iron, formed by the action of the hydrochloric acid upon the peroxide of iron existing in the vessels of stone in which it has been prepared. Independently of these two foreign substances, this acid is sometimes found to contain, in solution, chloride of lead and sulphurous acid: the presence of perchloride of iron may be shown in this acid by diluting it largely with water, and adding a few drops of a solution of ferrocyanate of potash: a deep blue color is immediately produced, and a precipitate shortly after.

The existence of protochloride of lead is indicated by an examination of the residue of the evaporation or distillation of a portion of this acid. This compound is exhibited in the form of small scales, white, and pearl-like, sparingly soluble in cold, but soluble in boiling water.

As to the sulphurous acid, which now and then exists in this acid, and arises from the circumstance, that towards the end of the operation a part of the sulphuric acid in excess contained in the residue has been decomposed by the elevation of temperature, it is easy to recognize its presence by saturating the acid diluted with water, by a solution of baryta, collecting the precipitate upon a filter and drying it at a moderate heat. This precipitate of *sulphite of baryta,* heated in a tube, is decomposed, and furnishes sulphur, which sublimes, and is converted into sulphate of baryta: treated with hydrated sulphuric acid, it immediately exhales a lively and penetrating odor of sulphurous acid.

M. Girardin, Professor of Chemistry at Rouen, proposes, in order to discover the existence of sulphurous acid in the commercial hydrochloric acid, a process founded upon the decomposition of sulphurous acid by protochloride of tin.

This is the method of operating—

Put into a test glass about sixteen grammes (half ounce) of the acid to be tested, add to it eight or ten *grammes* of crystallised protochloride of tin, which dissolve by stirring with a glass tube, and pour upon the whole two or three times its volume of distilled water.

When the acid is pure no change of color takes place, but however small a quantity of sulphurous acid it may contain, it will be seen, as soon as the protochloride of tin is added, that the acid loses its transparency, becomes yellow, and from the time the water is added, the odor of hydrosulphuric acid is perceived, and the liquid turns brown, depositing a powder of the same color: this precipitate is a mixture of the *protosulphuret of tin* and bioxide of the same metal.

In this reaction the tin of a part of the protochloride becomes free, and decomposes the sulphurous acid, so as to produce all at once the two compounds above indicated; as to the disengagement of the hydrosulphuric acid, it is owing to the solution of a little protosulphuret of tin formed by the hydrochloric acid which is present.

This simple and ready process offers the means of testing,

in less than a minute, the purity of the hydrochloric acid of commerce. According to Girardin, $\frac{1}{100}$th part of sulphurous acid cannot escape detection when these means are employed.

Means of ascertaining, in a direct manner, the proportion of hydrochloric acid in an acid liquid, the specific gravity of which is unknown.

This is made known by discovering what quantity of marble this acid will saturate. For this purpose, take a certain quantity, by weight, of acid, which you dilute with two or three times its weight of distilled water; then drop into it a piece of marble, the weight of which you have previously ascertained. The saturation being effected, take away the piece of marble, wash it, and, when dried, weigh it; the difference between the weights gives you the quantity of marble dissolved. To find the corresponding proportion of hydrochloric acid which has been saturated, you must bear in mind that two atoms of hydrochloric acid, weighing 455.13, are exactly saturated by one atom of carbonate of lime, weighing 632.46.

Or in establishing a rule of three direct, you easily attain the fourth term of the proportion, which is the quantity of acid that has been saturated by the weight of marble dissolved.

Suppose that in a preliminary trial, twenty grammes of hydrochloric acid had dissolved 8.45 of marble, you would have the following proportion:

$$632.46 : 455.13 :: 8.45 : x$$

$$x = \frac{8.45 + 455.13}{632.46.} = 6.08$$

The quantities of real acid contained in solutions varying in specific gravity, may be estimated by reference to a table of Edmund Davy, to be found in Turner's Chemistry.

ART. XXV.—ON NARCISSUS PSEUDO-NARCISSUS, AND ITS ACTIVE AND EMETIC PRINCIPLE, NARCITINE.

By Dr. Jourdain.

It is known that the *Narcissus pseudo-narcissus* has been the subject of many experiments; 1. M. Loiseleur Deslonchamps has attempted to discover the emetic principle of the bulbs and flowers, with the view of employing these indigenous products as a substitute for ipecacuanha; but the therapeutic experiments did not allow him to prove the presence of an emetic principle in this plant.

2. MM. Avuret et Waltecamp, physicians at Valenciennes, affirm that they have employed, with success, the flowers of the narcissus, in the dose of five to fifteen decigrammes, to produce vomiting.

3. M. Dufresnoy, physician at Valenciennes, has established that the extract obtained from the flowers has an emetic action in the dose of five to fifteen centigrammes.

4. M. Caventou, who analysed this plant, did not detect its emetic property; he perceived, from the analysis, that it was composed of a fatty odorous matter, of a yellow coloring principle, of gum and of vegetable fibre. M. Charpentier established the presence of resin, gallic acid, mucilage, extractive, lignin, and finally, chloride of calcium.

M. Jourdain attributes the properties of narcissus pseudo-narcissus, to a peculiar principle, narcitine, of which he states the properties. This substance is white, sweet, and transparent, with but little taste or smell; it is deliquescent and soluble in water, alcohol, and in vinegar. The dried scales of narcissus contain nearly one-half their weight of narcitine. This principle is less abundant in the flowers; when they begin to fade, they only contain gum; and the same of the leaves. On the contrary, the bulb is less rich in extractive during vegetation; it is in this principle that the emetic virtue of narcissus resides.

M. Jourdain has ascertained that the peculiar principle resides in nearly the same proportions, in the *narcissus poeticus*, lazetta, as in the pseudo-narcissus. The N. Jonquilla contains a more viscid matter than the preceding species.

According to M. Jourdain, the bulb of the N. pseudo-narcissus contains, in 100 parts,

Narcitine,	57
Gum,	6
Tannin,	24
Lignin,	28
Saline matter and vol. o l.	

The flowers of the narcissus contain scarcely 25 per cent. of narcitine.

The opinion of M. Jourdain, which agrees with that of MM. Avuret, Waltecamp, Dufresnoy, in establishing the emetic properties of narcissus, is contrary to the facts observed by MM. Loiseleur Deslongchamps and Caventou; it would therefore be useful to repeat these experiments, and to ascertain whether the narcissus collected in the department of Seine possesses the same properties as that which was examined by M. Jourdain.

Journ. de Chim. Med.

ART. XXVI.—ON THE ADULTERATION OF CREOSOTE BY ALCOHOL.

The "Revue Scientifique et Industrielle," published by M. Quenesville, contains the following article, which we think should be brought to the notice of our readers.

The solubility of Creosote in alcohol, affords the fraudulent dealer a good mean of adulterating this article. The strong odor of creosote does not, in fact, allow that of the spirits to be recognised. There is only one point by which the eye may distinguish its falsification, and that is the greater or less viscidity of the liquid. We are, therefore, obliged to examine the liquid, if we wish to arrive at certainty with respect to its purity.

Nothing is more easy for the chemist than the separation of alcohol from creosote; for creosote being more dense, distillation in a retort will suffice to isolate the alcohol as the first step; then the flame of this latter being high and clear, and not low, white and smoky, like that of creosote; the ease with which the liquid may be tried by the hydrometer; the odor of alcohol, although marked by a little creosote, is easy to recognise; besides, the fluidity of the products are sufficient characters. But we now write for the benefit of the purchaser, who has neither the time nor facility for these manipulations; he requires a prompt mean by which he may be able to indicate its presence in every case, and besides, have the advantage of not wasting the article.

Creosote, when pure, should mark on a hydrometer for acids 8° or 9°, at the ordinary temperature of 12° to 15°, C. Whatever it may want of this, is due to admixture. Creosote is sometimes found in commerce, so light that the alcohol hydrometer only will mark its degrees. This article is readily purified; it is only necessary to distil and examine successive portions of the product which passes over, to have the resi-

due in the retort, which is the creosote, perfectly pure. If this latter is colored, it may be purified by continuing the process.

We have procured creosote directly from the laboratories of Germany, and have seen, with pain, that some manufacturers of that country, ordinarily honest and conscientious, follow the errors occurring in the markets of Paris. One specimen marked 6°; from this there was derived a light liquid, having all the characters of alcohol. The liquid in the retort, after having lost, by distillation, all its alcohol, marked, when cold, 9°; on mixing together these two products, viz., that which came over in the distillation, and that remaining in the retort, the mixture, as before, marked 6°.

As an approximation, it is found that creosote of 6° contains seven per cent. of alcohol of 33°; and that 34 per cent. causes the gravity to descend to zero.

When very strong alcohol is used to mix with the creosote, it requires but very little to cause the indications of the gravity to descend, while if very weak alcohol is used, the proportion may be great to produce the same effect, so that it is difficult to indicate the proportion of creosote in any mixture without distillation; but as alcohol of 33° is that usually found in commerce, it is this which fraudulent dealers would most commonly use. X.

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ART. XXVII.—ON THE PROTO-IODIDE OF IRON AND ITS MODE OF PREPARATION; FOLLOWED BY FORMULA FOR ITS ADMINISTRATION, EMPLOYED FOR SOME TIME WITH REMARKABLE SUCCESS IN THE TREATMENT OF PHTHISIS PULMONALIS. By ALPHONSO DUPASQUIER.

ALTHOUGH this paper has for its essential object the bringing forward the pharmaceutical details of the preparation of proto-iodide of iron which I have introduced into medical practice, it appears to me to be indispensable, before entering upon this subject, to make known the circumstances which have led to its use; and to give, in a few words, an idea of the importance of the results which I have obtained.

This paper will therefore be divided into two parts; the first, historical and medical; the second, chemical and pharmaceutical.

FIRST PART.

* * * * * * *

SECOND PART.

Researches upon the Iodide of Iron of Pharmacy; the preparation of the Solution of Proto-iodide of Iron, and the formulæ for its employment.

The iodide of iron generally used, the preparation of which is pointed out in all the Pharmacopœias published for the last ten years, is a *totally different medicine,* both *in its chemical nature* and *in its therapeutic action,* from the *proto-iodide of iron* which I have used. *It is not a proto-iodide of iron,* as designated in all the formulæ, but a *mixture, of which the composition varies* according to the care used in its *preparation* and *preservation.*

This iodide, the only one which had been employed by physicians up to the moment when I commenced to report the

result of my observations* is, as is well known, a solid salt, prepared by evaporating to dryness the solution of the proto-iodide. During this evaporation, this salt is partly decomposed by the influence of atmospheric oxygen, and this alteration continues, even in the bottle in which it is preserved, for there is always present a certain quantity of air, which is renewed each time the bottle is opened. This alteration is the more easily produced, since the salt is deliquescent, and the moisture absorbed promotes the action of the oxygen.

* The most recent Pharmacopœias as the *Codex*, the *Elements of Materia Medica and Pharmacy*, by M. Bouchardet, and even the last edition of the excellent treatises of M. Soubeiran, published in 1840, only give the preparation of the solid iodide, and all the formulæ which they report from MM. Pierquin, Ricord, &c., indicate this same iodide. It is evident that in composing these formulæ, the authors are not concerned on account of the ready decomposition of the ferruginous salt in contact with air. It is this same iodide which is concerned in the formulæ recently published.

It is true, that in the latter numbers of the *Journal of Pharmacy*, there is given a formula for the syrup of proto-iodide of iron, prepared with a solution of this salt; but independently of this preparation being colored, which indicates that it is defective, the publication of this formula is long posterior to mine, made in 1838, in the *compte rendu de la Societé de Medecine de Lyon*, where, from page 176 to 181, an account is given of my solution of pure proto-iodide of iron, and of a syrup which I prepared by mixing it with syrup of gum. It is from this account, which was distributed in great number to learned societies and medical journals, both in France and elsewhere, that some collections of therapeutical observations have spoken of the solution and syrup of proto-iodide of iron. This syrup has been prepared for more than three years, according to my directions, in most of the shops of Lyons. One collection of formulæ, published during the current year, (that of M. Foy,) gives, even *under my name*, formulæ for the proto-iodide of iron, which are not exactly such as I have pointed out. Finally, the therapeutical application of the colorless solution of proto-iodide of iron, as well as the directions for its pharmaceutical preparation, in which the pure proto-salt is preserved without alteration, really belong to me. No one, before myself, had pointed out the necessity of using a proto-iodide not altered by the air; the whole therefore is not less new than the employment of the same preparation in the treatment of phthisis pulmonalis.

All the characters, whether physical or chemical, demonstrate that the iodide of Pharmacy is not a proto-iodide of iron;

1. This salt, instead of being *without color*, or *very slightly greenish*, as the proto-iodide should be, is always a brown of greater or less depth;

2. When dissolved in water, the liquid which should be *without color* is of a *reddish brown*, more or less deep, according as the iodide has been subjected for a greater or less time to the influence of atmospheric oxygen;

3. The *odor* and *taste* of this solution evidently indicate the presence of a notable quantity of free iodine; the solution of proto-iodide recently prepared, and pure, is *inodorous*, and *has no other taste* than that proper to *all the ferruginous salts;*

4. The colorless solution of proto-iodide does *not exercise any apparent action upon starch;* a single drop of the solution of the iodide of the Pharmacopœias immediately *strikes a blue color;*

5. If, after greatly dilating the solution of the solid iodide of the Pharmacopœias, it is tested by the yellow cyanide of potassium and iron, it immediately becomes a *deep blue.* The solution of the proto-iodide of iron, on the contrary, when well prepared, that is to say, when perfectly colorless, and not subjected to the influence of atmospheric oxygen gives with the same, *like all the protosalts of iron*, a precipitate of a bluish white.

To recapitulate, according to these characters, the *solid iodide of Pharmacy*, designated in the Pharmacopœias, and the formulæ under the name of *proto-iodide of iron*, should be considered as a mixture in variable proportions of—

Free iodine,
Periodide of iron, more or less mixed with proto-iodide, not yet decomposed,
Sesquioxide of iron.

The presence of free iodine, or at least of an iodide strongly

iodüretted, is proven by the odor of the compound, and the blue color produced with starch. The deep blue precipitate produced by the yellow cyanide of potassium and iron, demonstrates that the iodide is partly, if not wholly in a state of per, and not proto-iodide. As to the presence of the sesquioxide of iron, it does not naturally belong to it, but is the necessary result of the change which the proto-iodide undergoes from the action of the air. When we keep a solution of proto-iodide only two or three days, we percieve this oxide commencing to form as a reddish deposit. M. Dumas supposed that it was an insoluble combination of iodine and sesquioxide of iron.

The foregoing remarks suffice to prove that the iodide usually employed in Pharmacy under the name of proto-iodide of iron, is not a proto-iodide, but a mixture varying in composition, and consequently in therapeutic effects; it differs then essentially from the proto-iodide of iron, the administration of which has been followed by advantageous results in the treatment of phthisis pulmonalis. I may add that the former cannot replace the latter, clinical observation having proven that the least alteration in the colorless proto-iodide will suffice to weaken its medicinal properties, and to communicate an irritant action, which totally changes its effects.

With these explanations I proceed to the preparation of the proto-iodide of iron, and to the formulæ of which it is the basis.

In combining the elements of the preparations which have been made into formulæ, the object was to facilitate the means of varying the administration of the proto-iodide of iron, as well as to insure to this new remedy a perfect state of preservation.* In all these preparations, the *normal solution excepted*, the proto-ioduretted compound is free from contact

*I have proven, by clinical observation, this important fact, that the proto-iodide of iron, under whatever form it may be given, acts in an identical manner, whenever it has not suffered any change.

with atmospheric oxygen, either because it is in contact with carbonic acid, (carbonated water,) or enveloped in gum, or gelatine, or honey—substances which have the property of preserving the salts of the protoxide of iron from oxidation by contact with the air, from which a partial decomposition would result, that is to say, an alteration.

The first formula is that of the *radical* medicine, that is to say, of the preparation which I have constantly employed for the treatment of phthisis in the Hotel Dieu: it is for this reason that I have named it *the normal solution of the proto-iodide of iron.* I desire that physicians should prescribe it under this title, and for greater certainty, to add the name of the author, so that this medicine may not be confounded with the pretended proto-iodide of iron of Pharmacy, which, I repeat, is of the first importance in a therapeutical point of view.

This normal preparation serves as the base of all the others. I have taken care, at the end of each formula, to point out the proportion in which the normal solution enters into the resulting preparation; by this means, practitioners have it in their power to vary their prescriptions without departing from the proportions indicated in my therapeutical observations.

FORMULÆ.

Normal Solution of Proto-iodide of Iron of Dr. Dupasquier.

℞. Iodine,	10	grammes.
Iron filings,	20	"
Distilled water,	80	"

Introduce the whole into a small matrass, which is to be placed for eight or ten minutes in water heated to 70° or 80°, C., (but not boiling, for this will volatilise a part of the iodine.) Shake the mixture several times.*

* This preparation may be made in the cold, but we then experience a little more difficulty in obtaining a perfectly colorless solution. If we ope-

Remark.—As soon as the combination begins to be effected, the proto-iodide of iron formed completely dissolves the iodine, and the liquid becomes of a *reddish brown.* If we continue for some minutes to heat the solution, and shake the mixture, *the brown color disappears*, which indicates that the iodine and iron is completely combined. We may acquire an absolute certainty by filtering the liquid, which should be perfectly *colorless*, or at least have an *almost imperceptible greenish hue.* When the liquor retains a red color, or only slight yellow, or even a deep green, it is indispensable to replace the solution on the iron, and retain it in contact until, on filtering, the solution shall pass without color.

The quantity of iron indicated in the formula, far exceeds what is necessary to saturate the iodine, since the proto-iodide of iron is composed of

1 atom iron, or	17.8
2 " iodine, or	82.2
	100.0

But this is of no consequence, as the iodine can dissolve only a limited proportion of the metal. My object in employing a great excess of iron, is to render the combination more rapid, and render certain in every case the complete saturation of the iodine, *even in inexperienced hands.* Experience has demonstrated, that even when equal parts of iodine and of iron are used, it is difficult to obtain a perfectly colorless solution. It is then more frequently of *a deep*

rate in this manner, we should proceed as follows: shake the mixture, then allow it to stand for some minutes; the iodine then reacts upon the iron, the vessel becomes strongly heated and combination takes place. We may facilitate this by two or three agitations, when the mixture has reached its highest temperature. On the contrary, if we constantly shake the mixture from the commencement, the mixture does not attain the same degree of heat, and the combination is longer in taking place.

green, by which we may recognise an iodide with an excess of iodine.

This preparation should be made extemporaneously; it does not answer to keep it; left only for an hour in contact with the air, it begins to alter; one part of the iron absorbs oxygen, and is precipitated as a sesquioxide; the iodine, which is hence set free, is dissolved, and communicates to the liquid a reddish brown color, the more intense in proportion as the decomposition proceeds. The decomposition of the proto-iodide of iron takes place in a full and well stopped bottle, which may be explained by the decomposition of water effected by the action of protosalt of iron.

Practitioners should not prescribe the normal solution by drops, since it cannot be preserved; neither can it be kept in a diluted state, as a potion or tisane, for, even in these mixtures, its alteration is very rapid.

2. *Syrup of Proto-iodide of Iron.*

℞. Normal solution of proto-iodide of iron,	4	grammes.
Colorless and very thick syrup of gum,	200	"
Syrup of orange flowers,	50	"

Mix exactly by shaking for some moments.

Remark.—It is indispensable that the syrups of gum and orange flower should be colorless, that the physician may have an assurance that the medicine is not altered. It is also useful to give to these syrups more than ordinary consistence, that the normal solution may not render them too fluid; a circumstance which would facilitate the alteration of the protosalt by contact with the air. Maintaining this precaution, the syrups of the proto-iodide of iron may be preserved for a month, and even longer; a necessary circumstance for a patient who is distant from an apothecary.

Each spoonful of the syrup represents very nearly four drops of the normal solution.

We may mix, without inconvenience, this syrup, but only at the moment when it is to be taken, with a cupful or half a

glass of milk, of seltzer water, of barley water, oat meal water, &c.

3. *Carbonated Water of Proto-iodide of Iron.*

℞. Normal solution of proto-iodide of iron,	1 gramme.
Seltzer water,	1 bottle.
Syrup of gum,	80 grammes.

Open the bottle of seltzer water, throw out promptly an amount equal to the syrup and solution mixed, pour in both the latter, and carefully cork the bottle. Shake the bottle for some minutes to mix the ingredients.

Remark.—We may have carbonated waters of proto-iodide of iron No. 1, 2, 3, and 4, by increasing, in the following manner, the proportion of the iodide.

Carbonated water,	No. 2,	2	grammes	proto-iodide.
" "	3,	3	"	"
" "	4,	4	"	"

The operation should be conducted as rapidly as possible, to prevent too great a loss of carbonic acid.

The patient, during the day, must take at least the whole of the liquid contained in a bottle; if he dislikes to drink so much, a half bottle of seltzer water may be used, without changing the proportion of the normal solution; it is only necessary to diminish the amount of syrup.

4. *Marmalade of Proto-iodide of Iron.*

℞. Normal solution of proto-iodide of iron,	15 drops.
Honey of Narbonne,	50 grammes.

Mix.—To be taken by teaspoonfuls in the course of the day.

Remark.—We may gradually increase the dose of the proto-iodide. If the mixture should be too fluid, part of the honey is to be replaced by powdered sugar.

This marmalade may be flavored according to the taste of the patient, as for example, with vanilla.

5. *Pills of the Proto-iodide of Iron.*

℞. Iodine,	8	grammes.
Iron filings,	16	"
Distilled water,	25	"

To be prepared like the normal solution, then filtered, and poured into an untinned iron cup. Add afterwards,

Honey of Narbonne, 20 grammes,

evaporate rapidly, until a large part of the water of the proto-iodide has evaporated, that is, until the mixture acquires the density of a clear syrup; add afterwards, by little and little, continually stirring with a spatula,

Powdered tragacanth, 12 grammes.

By the process indicated, there will be obtained a mass of a suitable consistence, which may be divided into 200 pills, each weighing nearly 20 centigrammes.

Each pill represents very nearly four drops of the normal solution.

Remark.—These pills remain unaltered for a long time. It is also easy to ascertain whether they are well prepared; and if their preservation is perfect, it is sufficient to cut one of them into thin slices by means of a knife; the slices should be colorless and slightly translucent.

The pills of proto-iodide of iron may replace with advantage those of Vallet and of Blaud, in the treatment of chlorosis.

6. *Lozenges of Proto-iodide of Iron.*

℞. Normal solution of proto-iodide of iron, 20 grammes.
Mallows paste, a quantity sufficient to make 200 lozenges.

Pour the solution into an iron cup, and add

Powdered sugar, 32 grammes.

Heat. When the syrup has acquired the proper consistence, mix it rapidly with the paste, and divide into lozenges.

Each lozenge contains about one drop of the normal solution.

Remark.—It would appear to be more simple to add the normal solution to the paste, and then give it the consistence it requires, by incorporating the powdered sugar; but I have remarked that the proto-iodide is oxidised during this preparation, and that we obtain a paste colored of a yellowish brown. The lozenges when well prepared, should be without color.

7. *Jelly of Lichen, with Proto-iodide of Iron.*

℞. Normal solution of proto-iodide of iron,	30 drops.
Jelly of lichen,	100 grammes.

Take the liquid which is to make the jelly before this is prepared; or, which is better, liquify the jelly by a gentle heat, then add the solution of proto-iodide of iron. Afterwards place the liquid in the cellar, until it acquires a gelatinous consistence.

The dose of the proto-iodide may be gradually increased.

8. *Enema of Proto-iodide of Iron.*

Normal solution of proto-iodide of iron,	15 to 20 drops.
Solution of gum Arabic, somewhat viscid,	half a pint.

Mix.—For two half enemata, one to be taken in the morning, the other in the evening.

Remark.—This mode of administration may be used when the patient has great objection to the taste of the medicine, or when the stomach is offended by it, which is rare. It is also a means of employing the proto-iodide of iron without the knowledge of the patient.

If the intestine rejects the liquid, as sometimes happens, it is proper to add to each half enema three to six drops of

laudanum of Rosseau; this is also suitable when diarrhœa exists.

Whatever form of administration may be adopted, the normal solution should be given, at first in the dose of fifteen drops per diem, and gradually increased to one hundred and twenty drops.

I use as adjuncts to this treatment the employment of tonics, such as Bordeaux wine, the stomachic elixir of Hoffman, wine of cinchona, the extracts of marsh trefoil, of the lesser centaury, of the blessed thistle, of germander, &c.; at the same time the patient uses a strengthening diet, composed principally of roast meats, either beef or mutton.

To obtain the best results perseverance is necessary. A slight diarrhœa, or gastric irritation, should not prevent its continuance. It is only proper to suspend it when the oppression is very great and there is danger of suffocation.

Journ. de Pharm.

ART. XXVIII.—ON MANNA.

The tree which produces the manna (*Fraxinus ornus*) is an ash of a peculiar quality, and is regarded by Linnæus as a variety of the common ash. It is indigenous in the south of Italy and in Sicily; and the following account of it, as well as of the processes by which the manna is obtained, is taken chiefly from the "Voyage Pittoresque des Isles de Sicile, de Malte, et de Lipari. Par Jean Houel, Peintre du Roi, en 1776." The tree rarely attains a greater height than twenty-five feet, and there is nothing particularly striking in its appearance: it might, on the first view, be taken for a young elm; but, on more minute examination, its particular character is found in the manner in which the leaf is attached to the branch. Three species, or, more properly, three varieties of this tree have been observed. The first has the leaves long and straight, like those of the peach; in the second, the leaves strongly resemble those of the rose-tree; and the third seems intermediate between these two varieties.

It is when the season is at the warmest that the tree most abounds in sap. Therefore, about the 15th of August the people begin to make their incisions in the bark. They commence at the foot, making an incision each day, over the preceding, and at the distance of two inches from it, until they reach the lower branches. The incisions are little more than two inches in horizontal length, and are about half an inch in depth. When the season is favorable, they continue to make their incisions so far as the great branches; but though they make no more than one daily, they have, towards the end of September, already made forty-five, which at two inches distance between them, gives an elevation of ninety inches; and as there are few trunks which are more than seven and a half feet high, they rarely go to a greater distance.

When the knife has with some difficulty made an incision

in the tree, the manna begins immediately to flow. It at first is no more than a limpid water; but it gradually congeals as it flows, and is soon hardened to a consistence. The rainy season, which comes on at the end of September, interrupts this work. The heat is then not sufficient to dry the juice, and the rain soon detains it at the foot of the tree, so that it is necessary that the operations should conclude with the warm weather of September.

Having given this general statement, we may proceed to describe more particularly the process which is followed in collecting the manna. When an incision is made in the manna tree, a leaf of the same is inserted, by the extremity, in a slight horizontal cut below the incision. The juice which exudes from the tree flows upon this leaf which, like a pent-house, conducts it to a vessel placed below. This vessel is very simple, being merely a leaf of the Indian fig-tree, which, in drying, takes the form of a basket, or rather a shell. It is from ten to twelve inches long, and seven or eight in breadth, and forms a sort of vase, sufficiently capacious for the use to which it is applied. Placed at the foot of the tree, it receives the juice, which does not harden until it has remained there some time. The manna thus received and congealed is much more esteemed than that which escapes down the bark of the tree, which is less pure and less fit for use. This latter comes in great quantity when the operation of nature is in its full force. It takes the form of icicles or of knotty reeds attached to the tree, full of inequalities and large in proportion to the abundance of the juice. Being sweeter than the purer sort, it is much more in requisition, and is especially preferred by the English. The two sorts, however, are most usually mixed.

M. Houel states, that he often tasted the manna as it flowed from the incisions. It then had a bitter taste, like that of some unripe fruits. This bitterness is owing to the watery matter, the evaporation of which concentrates the sugary parts and leaves them more sensible to the taste. The manna

is then sweeter and more agreeable, but is at all times slightly nauseous.

Men and women are indifferently employed in collecting the manna. The same knife which makes the incision serves also to gather the manna. The collected manna is deposited in baskets and carried away to the magazine where they dispose of it, and whence it is sent away in great quantities to foreign countries.

If the season is not favorable—if the heat is not steady and without rain—the people complain greatly; and if there appears the least disorder in the atmosphere, the saints and the madonnas are assailed with cries and tears from all parts, prayers are addressed to them, and wax tapers are offered at their shrines, for the grant or continuance of fair weather.

The manna formed a principal source of emolument to the parts of Sicily in which it was cultivated in the time of M. Houel; and the inhabitants were distinguished from those of other parts of that country by their comfortable and pleasing appearance. The medical properties of manna are those of a gentle purgative, particularly adapted to the use of children, and it was accordingly much employed formerly in medical practice. But it has now gone nearly into disuse, as we are in possession of so many substances that are more efficacious. This circumstance has probably had considerable effect on the prosperity of the places which were formerly enriched by the culture of the manna tree. The drug was some time since subjected to chemical analysis by M. Bouillon la Grange, who found it to consist of two distinct substances, one nearly resembling sugar, and the other probably analogous to gum or mucilage, as, when treated with nitric acid, it was found to yield the mucous acid.

We may be at liberty to doubt the following pretty story concerning manna, even though we find it in Jeremy Taylor. "When the kings of Naples enclosed the gardens of Œnotria, where the best manna of Calàbria descends, that no man might gather it without paying tribute, the manna ceased till the tribute was taken off, and then it came again; and so,

when after the third trial the princes found they could not make their gain of that which God made to be common, they left it as free as God gave it."

Penny Magazine.

ART. XXIX.—ON BELLADONINE. By PH. LÜBEKIND.*

M. BRANDES having demonstrated, by his experiments, that the leaves of the *Atropa belladonna* contained two new organic bases, one of which is solid and crystallisable, and the other volatile, and possessing strong analogy to ammonia. M. Brandes having completed his researches, M. Lübekind continued them under the direction of Prof. Lowig. M. Lübekind took thirty pounds of the dry leaves of *belladonna* and distilled them in an alembic of tin, with twelve pounds of caustic potassa. To the product of this distillation he added, drop by drop,† chloride of platinum; in place of a granular powder, crystallised in otohedra, he obtained a white precipitate, not crystallizable, and readily soluble in ammonia. This white precipitate was mixed with two parts of pure dry carbonate of potassa; the mixture was introduced into a retort, and slightly heated. It suddenly acquired a somewhat black color, and disengaged carbonic acid, while in the upper part of the beak of the retort a white sublimate appeared; this is pure *belladonine.* In the disengaged gas he recognised, by odor only, hydrochloric acid, although chlorine was not detected in the sublimated matter, even after exposure for several hours in a place heated to 35° or 40°, C.

Belladonine has a great analogy in its odor to ammonia. It is but slightly poisonous; taken fasting, in the dose of two and a half grains, he experienced only a burning sensation of

* Dall. Archiv. der Pharm.

† Annuar. delle Scienze Chim. Pharm.

the throat, which disappeared when he had dined. This alkaloid dissolves entirely in water, and then possesses an alkaline reaction, which does not disappear on the application of heat like ammonia; it neutralises acids, and forms a series of salts. The analysis of this substance, by means of the apparatus of Mittscherlich, yields *carbon*, *nitrogen*, *hydrogen* and *oxygen* in proportions not yet determined.

Lowig considers this base as formed of two compound bodies, because it is decomposed by nitric acid, with frothing, caused by the disengagement of carbonic acid. In every experiment to which it was submitted, it appeared to contain nitric acid. If this substance is heated, it fuses, with disengagement of ammonia and nitrogen, and there remains a white residue, which volatilises with difficulty in yellow crystals, and gives out an odor like that of cyanogen; by trituration with hydrate of lime, there is no disengagement of ammonia. Hydrochloric acid exercises a like reaction, which gives rise to another yellow substance, crystallisable in rhomboids, with an acid taste, and burning luminously when fusion is attempted in a glass tube; a solution of nitrate of silver does not produce any precipitate in this singular compound. Neither lime or potassa develope ammonia; and the strong odor of this gas is not perceived when it is fused with caustic potassa.

J. de F.

Journ. de Pharm.

ARTICLE XXX.—UPON POISONING BY CONCENTRATED ACIDS; AND THE FIRST REMEDIES TO ADMINISTER.

By A. CHEVALLIER.

MY object in publishing an article on poisoning by concentrated acids, is not to elicit discussion. I admire not this kind of contention, and have often shown evidences of this feeling. But, first, to draw the attention of men of science to opinions thrown out upon the subject of the remedial substances to be administered in case of accidents from concentrated acids, and to induce them to publish the observations they have collected in the course of their practice. Second, not to leave uninformed, the persons who, as pharmaceutists, are called upon to administer the first remedies to individuals who either intentionally, or by accident, have been poisoned by such concentrated acids as sulphuric, phosphoric, nitric, and hydrochloric. Third, to establish the point that, in the different works which I have published, I have not been in error in pointing out the employment of alkalies, and especially magnesia, as an antidote to these acids.*

To the present time, the greatest number of practitioners have agreed that the first assistance to be given for poisoning by acids, consists in the administration of alkalies, and parti-

* An apothecary of Paris, M. Dupuy, who lives in a quarter where there are a great number of bleachers, has several times been called upon to render assistance in cases of poisoning by blue liquid. He has obtained constant success by employing carbonate of magnesia. He gives this salt in preference to magnesia, because the carbonate produces vomiting at the same time that it neutralizes the acids.*

* We have been informed of a case which, from a similar cause, occurred in this city, where the individual had recourse to a profuse draught of chamber lie, used in the establishment, with the same result as above,—ammonia, in this case, was the neutralizing agent.—*Ed. of Am. Journ. Pharm.*

cularly decarbonated magnesia!* Numerous facts appear to demonstrate the good effects derived from this mode of medication.

Now it is attempted to be established that this mode of practice is not rational, and that it is necessary to follow another method. It is supposed that all the acid taken in is at once absorbed; and it is asserted that the acids are cold or hyposthenic poisons, and that it is necessary, 1st, to cause the subject to vomit, by irritating the throat with a feather; 2d, to cause him to drink, without delay, pure wine, mixed with warm broth; 3d and lastly, to add magnesia with the drink, if it is supposed that any now absorbed acid remains in the stomach.

We do not attach more importance to the employment of one method of treatment than to the other, but we think that the method which ought to be adopted is that which facts have demonstrated to be followed with success; now, if we consult authors who have published observations of poisoning by the concentrated acids, it will be seen that in the majority of cases, the alkalies, when they have been employed in time, have saved the patients. If we search for the facts, which will allow the results of the new method to be studied, they are found not to be numerous, at least within our knowledge. What ought we to conclude, then, from these researches? It is, that we ought to employ the method which is most certain, and that we should not make experiments upon man to establish the value of different methods.

We think that experiments made upon animals might elucidate the question; we at least express the wish that they should be tried by the individuals who are anxious to establish that the anti-hyposthenic method should prevail over the method by saturation.

To allow our readers an opportunity to study the facts, we shall indicate here, 1st, the cases of poisoning by concentrated

* Lunding, *De olei vitrioli et aquæ fortis turgitur ingestorum sequelæ earum que cura,* (Copenhagen, 1821,) has proposed to employ mucilaginous drinks, after the method of the ancients. He says that sometimes neutralizing agents are injurious.

acids, which have fallen under our observation, and in which the method by saturation has succeeded. 2d, the cases in which autopsy has demonstrated that the acids are not absorbed, as has been pretended.

Cases of poisoning treated successfully by alkalies, or substances capable of saturating the acids.

The first case that we shall cite was observed in 1825, by M. Correa de Serra, Jr. Madame V. J., seamstress, having swallowed, by mistake, two ounces of concentrated sulphuric acid, was treated by means of magnesia; she was saved, but for a long time remained affected by the disastrous consequences of the cauterization of acids.—*Journ. de Chimie Med.*, to. ii, p. 210.

The second has been stated by M. Gabriel Pelletan, in 1825. M. N., aged 29 years, made an attempt to poison herself by blue liquid, (a solution of indigo in concentrated sulphuric acid.) This blue had been diluted with water. Calcined magnesia secured results so beneficial, that the patient was promptly relieved and cured.—*Ibid*, to. i, 2 ser, p. 11.

The third has been communicated to us by M. Lalande, a pharmacien at Falaise. M. Fert, a dyer, having swallowed, by mistake, a glass of concentrated sulphuric acid, magnesia was administered to him; the first symptoms were arrested, and the individual was saved.—*Ibid*, to. iii, 2 ser, p. 439.

The fourth was observed in 1837, by M. Emery. A young woman was carried to the hospital St. Louis, ward Napoleon. She was treated by magnesia, and this treatment, which gave rise to some purgation, removed the symptoms; the patient left the hospital cured.

The fifth case is very recent. A servant of M. M***, having taken sulphuric acid for wine, drank a certain quantity of it; magnesia was immediately administered; in a little time she was in a fit state for her duties; but she still lives upon milk.

Poisoning by Nitric Acid.

I have had occasion to observe two cases of poisoning by nitric acid.

The first in 1820, or 1821, at the hospital of La Pitie. A young jeweller was carried to this hospital; he had swallowed, in consequence of disappointed love, very near half an ounce of aqua fortis. Scarcely had he arrived, before a dose of calcined magnesia was administered to him. This calmed the symptoms, and ten days afterwards he left the institution. This workman for a long time remained remarkably meagre and emaciated.

The second, in 1828, or '29. We were informed that a young woman had, in consequence of disappointment, poisoned herself with nitric acid. We immediately repaired to the patient; administered to her, almost by force, at least four ounces of calcined magnesia, mixed with water. The symptoms were relieved, and the patient very speedily cured; she still lives, as but a short time since we have met with her.

These facts demonstrate, in our opinion, that magnesia is the antidote of the acids, and ought to be employed in cases of poisoning by them.

Are the Acids absorbed in cases of Poisoning by them?

In referring to works which have been accessible to us for information upon poisoning by acids, we are enabled to state, that when poisoning by an acid takes place, the acid is not absorbed, but remains upon the tissues. In fact, 1st, the examination of the stomach and intestines taken from the dead body of *Cuiquin,* who died at Montmartre, in consequence of the ingestion of sulphuric acid, October 6, 1835, has evinced that the organs contain a very great quantity of free sulphuric acid, which had not been absorbed.—*Rapport Judiciaire, du October* 27, 1835.

2d. The examination of the stomach and intestines of M. Doré, who died of poisoning by sulphuric acid, has shown that the stomach contained a great quantity of free sulphuric

acid which had not been absorbed, and that a part of the intestine contained the same free acid.—*Rapport Judiciaire, du 7 Janvier*, 1838.

These facts demonstrate, in our estimation, that in poisoning by concentrated acids, the acid is not absorbed, and that it is necessary, in cases of poisoning by the acids, to destroy them by means of an absorbing substance.

We may be told, it is true, that here we do not operate in a capsule, in a retort or alembic, (it is the common remark of all those who oppose the application of chemistry to medicine.) We reply to it, that poisoning has occurred from quantities of acids sufficient to occasion death; the antidote has been administered; the patient has been saved: what more can be asked?

We shall terminate here what we have to say upon the subject, and we await, in order to believe that we ought not to administer the alkalies or the alkaline carbonates, in cases of poisoning by the concentrated acids, the demonstration by positive facts, 1st, that it is possible to save the patient by other methods. 2d, that these methods are preferable. 3d. that the acids taken into the stomach are entirely absorbed, which appears not to have taken place, if we rely on the examination of organs taken from subjects who have perished by their introduction.

Journ. de Chimie Med.

ART. XXXI.—SELECTIONS FROM ROYLE'S PRODUCTIVE RESOURCES OF INDIA.

CULTURE OF PEPPER IN THE CIRCARS.

THE desire of Dr. Roxburgh to make his scientific discoveries tend to practical purposes is conspicuous in his endeavors to cultivate Pepper in the Circars, and in the number of useful plants which he introduced into the Company's Pepper plantations established at his recommendation in the neighborhood of Samulcottah. As the origin and progress of this attempt at a new culture are productive of some useful lessons, we may enter a little more into detail than would otherwise be necessary.

Dr. Roxburgh himself states in a letter, dated Samulcottah, 25th August, 1788,—"Since the end of 1781, I have been stationed here, and as soon as I became a little acquainted with the Seasons, Soil, and Produce of the country hereabouts, I formed an idea that Pepper and Coffee would thrive as well in this Circar as in any part of Asia; my natural turn for Botany, Agriculture, and Meteorological observations, enabled me to form the idea upon pretty certain grounds." But, on the 25th April, 1786, he had written, "I have the pleasure to inform you, that since my return I have, for the first time, discovered that Black Pepper is found growing wild in some parts of the hills to the north-west of this; the natives of these hills bring small quantities frequently down to the plains to sell." Mr. Ross, in a letter to Sir A. Campbell, Governor of Madras, in reference to some samples of this pepper sent by Dr. Roxburgh, and which the latter described as equal to, if not better, than the best Malabar or Ceylon pepper, says, that "on comparing it with the pepper from the Malabar coast, which is here in the shops for sale, the shopkeepers say that the former is at least ten per cent. better in quality." Mr. Ross further writes (13th Aug., 1786,) "The most particular orders were given in time to the Chief and Council of Masulipatam, to furnish Dr. Roxburgh with all the necessary dis-

bursements, to enable him to proceed, and to give orders to the zemindars to assist and encourage the undertaking." The Court of Directors, moreover, in the General letter to Madras, dated 22d April, 1789, expressed their approbation of the undertaking,* and ordered that every encouragement and assistance should be afforded to Dr. Roxburgh.

The Pepper was brought for sale to Cottapilla, at the skirts of the hills; but the Plants were procured from Rampa, about thirty miles within them, and about fifty directly north from Samulcottah. It was afterwards discovered growing wild in almost every valley amongst the mountains, immediately north of that station. The plantations were established about six miles inland from Samulcottah, and about eight or ten miles from the nearest point of the sea, where they were sheltered by innumerable clumps of mangoe-trees. About five hundred slips were first obtained. These, by the end of 1787, had formed four thousand plants, which at the end of the second year had increased to forty thousand in number, the props being formed chiefly with the branches of the Moochy-tree (Erythrina indica.)

On the 17th July, 1790, Dr. R. writes, "I have brought this species of culture to such a pitch of perfection as must convince every person, that the Pepper-vine will thrive as well on this coast as in any part of India." The rate of its productiveness had, however, yet to be ascertained; but before they were old enough for this purpose a difficulty arose, from Dr. Roxburgh discovering that, instead of the real Pepper plant of Sumatra and the coast of Malabar, (Piper nigrum of botanists,) he had found a new species, which, though yielding an equally good Pepper, was more difficult of culti-

* "In our letter of the 31st July, 1787, we approved of the measures you had taken to assist Dr. Roxburgh in the cultivation of Coffee and of the Pepper plant in the Rajahmundry Circar; but for want of information, &c., we could not decide how far it was a measure meriting our further encouragement. Having since received this information, and likewise the most favorable accounts of the success of the undertaking, we now order and direct that you afford Dr. Roxburgh every encouragement and assistance in your power, in the cultivation of such useful articles of our commerce, particularly that of Pepper."—Oriental Repertory, i. p. 24.

vation. This was in consequence of the male and female flowers being on different vines, and there being a third kind, with hermaphrodite flowers, or hermaphrodite and female flowers mixed, on the same catkins. Hence Dr. R. has called this species Piper trioicum, which he had taken for the true Pepper-plant before he had an opportunity of seeing that famous plant. The natives had increased the difficulty by supplying him in the first instance only with the barren plants. The pepper of the second kind had less pungency than common pepper, but the third sort ripened perfectly, and when dry was exceedingly pungent. Dr. R. was equally unfortunate with the pepper which he sent to this country by a private hand to have its value ascertained, as it was seized by the Custom-house officers.

Into the Pepper plantations Dr. Roxburgh also introduced Coffee, Cinnamon, Nutmeg, Annatto, and Guinea Grass; also the Bread-fruit tree, which had been found growing luxuriantly in Cochin, called by the Dutch, Maldivy Jack; and also mentions having "thousands of young Sappan-wood trees in the Company's Pepper Plantations." He introduced the Teak into the low grounds of the Circars, though it was common in the hills of the Rajahmundry Circars, recommending its being planted in every vacant corner; and mentions that Lord Cornwallis and Col. Kyd had been for some time introducing it into Bengal. He also procured the eggs of the Sile-worm, and proposed its culture in the Circars, as the Mulberry grew there most luxuriantly from cuttings; and obtained copper sugar-boilers from Bengal, in order to try and improve the quality of the Sugars. His paper on the culture and manufacture of sugar in India is among the most interesting which has been published.*

* An Account of the Hindoo method of cultivating the Sugar-cane, and manufacturing the Sugar and Jagary, in the Rajahmundry Circar, interspersed with such remarks as tend to point out the great benefit that might be expected from increasing this branch of Agriculture, and improving the quality of the sugar; also the process observed by the natives of the Ganjam district in making the sugars of Barrampore. By Dr. William Roxburgh, Samulcottah, 20th June, 1792.

CULTURE OF COCHINEAL IN INDIA.

Dr. Roxburgh further mentions having received slips of the Cactus or Opuntia, obtained by Sir Joseph Banks from the Royal Gardens at Kew, and sent out by the Court of Directors, which, he states, grew astonishingly. Attention had been called to this subject by Dr. James Anderson, physician-general of the Madras army, who was distinguished as much for his professional attainments as for his constant attention to whatever would afford employment to the natives, and improve the productive resources of the country. Dr. Anderson had found an insect, which he imagined to be a kind of Cochineal, and with which he had dyed pieces of Flannel, Shawl, and Satin. Specimens were forwarded to the Court of Directors, and by their order subjected to various experiments, but were found to be entirely useless in dyeing.

Sir Joseph Banks obtained similar results, but having ascertained (22d May, 1787,) that the specimens sent him were those of a real species of Coccus, he conceived the idea that the true Cochineal might easily be cultivated on the Coromandel Coast, as the "climate was as good as that of the West Indies (where it had been introduced;) the soil suitable to the production of the Cactus with few spines, and labor as cheap if not still more so, than in Mexico."* The Committee of Warehouses of the Court of Directors were led to entertain the same view, as they state in April, 1788.—"The supposed discovery of Dr. Anderson in the environs of Madras, which, although unsuccessful in the issue, has, nevertheless, led your Committee to conceive that the Insect may very successfully be introduced and propagated in the British settlements in India, to the advantage of the natives, the Company, and the British nation, by giving to the former a new article of Cul-

* Letter to Sir Joseph Banks, Bart., P. R. S., on the subject of Cochineal Insect, discovered at Madras; 1788. By James Anderson, M. D., Physician-General, Madras.

ture, to the second an additional article of Commerce, and to the latter a participation in a lucrative article of Trade, which has hitherto been enjoyed unrivalled by a neighboring power." At their recommendation sealed orders were given to the captains of some ships proceeding to the Brazils, to procure, if possible, some of the real insect, and carry it to the coast.

Dr. Anderson was in the meantime permitted to establish, with Dr. Berry placed under him as superintendent, a garden to be called the Company's Nopalry, for the cultivation of the several kinds of Cactus, on which alone the true Cochineal feeds.

Plants of Cactus were obtained with considerable difficulty. One species, extremely common in many parts of India, was undervalued as being thought unsuited to the insect. It is called by the natives *nag-kalli* and *nag-phunee*, and by Dr. Roxburgh *Cactus indicus*, being thought to be indigenous; but it was probably introduced by the Portuguese. Plants were also obtained from Canton, Manilla, and the isle of France, as well as from the Kew Garden. All these four, Dr. Anderson states, were alike in appearance. In the course of three years, there were not fewer than two thousand Opuntia plants in the Hon. Company's Nopalry—all obtained from the few Kew plants. Specimens were distributed throughout the Presidency, as well as sent to the Botanic Garden at Calcutta.

Attention having thus been turned to the subject, the Cochineal insect was obtained by Capt. Neilson, of H. M. 74th Regt., on his return to India in June, 1795. When the fleet in which he sailed repaired for refreshments to the coast of Brazil, Capt. N., in his walks at Rio Janeiro, saw a plantation of Opuntias, and obtained several plants with the insect on them.* Many of them died during the passage to Bengal; and a few only remained alive on the last plant, of which se-

* Miscellaneous Communications, by James Anderson, M. D., Physician-General, Madras, from March, 1794, to October, 1796.

veral of the leaves had withered. Capt. N., on his arrival at Calcutta, sent the survivors to the Botanic Garden, where they were placed on the several species of Cactus, or Opuntia. On the China and Manilla species of the Nopal, and even on that from Kew, the survivors began to die fast. It fortunately occurred to make trial of the indigenous Opuntia, on which they were luckily found to thrive amazingly; and so rapidly, that Captain Neilson himself writes, on the 3d August, 1795, that he had the day before seen at the Company's Garden near Calcutta about one thousand fine plants covered with the insects: enough to stock all India. He hopes that Dr. Anderson had received the plants and insects sent by Dr. Roxburgh; and expresses his intention of bringing a fresh supply, with the hopes of "seeing in a very few months the plant and insect an object of cultivation over all the Carnatic, which I am inclined to think a more favorable climate for it than that of Bengal." Capt. N. concludes by saying, that great numbers of gentlemen in Bengal have already begun Nopal Plantations; and that Dr. Roxburgh had sent the insect to different parts of the country.

The insects sent to Dr. Anderson were delivered over to Dr. Berry, Superintendent of the Company's Nopalry at Madras, who, on the 26th August, reported, that the climate seemed most congenial to them in all exposures, as they had gone through all their stages from 28th July to the 24th August. He found the same want of success with the foreign, and, as in Calcutta, was obliged to have recourse to the country Nopal. As this was common everywhere, the culture and collection of the Insect very rapidly spread, particularly as the Collectors of Revenue were each furnished with a small quantity, and directed to exert themselves in the most strenuous manner; also to enclose spots of ground fifty or sixty feet square at some of the villages under each collectorate. On the 8th December, 1795, Dr. Berry further reported, that this Cochineal dyed casimere, cloth, and flannel with a color equal in brightness to the best scarlet, but that four times the quantity of the Sylvestre Cochineal reared in India was required

to produce the same color as that produced by the Grana Fina Cochineal of Mexico. In March, 1796, the Madras Government having determined to hold out the most solid encouragement to the cultivators of Cochineal, offered one pagoda per pound for the Cochineal, to such of the natives as might be disposed to employ their industry in its culture, this being considered by Dr. Berry an allowance liberal enough to encourage the cultivation.

Specimens of the insects collected and dried, both on the coast and in Bengal, were sent to the Court of Directors.* These specimens were submitted to examination by the best judges of the commodity in England, who all agreed that it was the Sylvestre, or wild species; and that there was little prospect of its being cultivated to any advantage for the supply of the Europe market, unless it could be offered at about one-third of the price of the Grana Fina, or at from 5s. to 6s. per pound, freight and all charges included.

The Madras Government had collected, in September, 1797, 21,744 lbs., and fresh supplies were then coming in, at the average price of nearly one pagoda per pound. By a statement, showing the issue of the sales of the Madras Cochineal in England in the years 1797, 1798, and 1799, it appears that 55,196 lbs. were sold at an average of 8s. 8¼d. per pound, which was little more than its prime cost in India. In 1807, the management of the purchase of Cochineal at Madras was transferred to the Board of Trade, who reported that since the date of the Court's letter of September, 1800, with the above statement, 73,366⅛ lbs. of Cochineal, amounting to pagodas 40,883:14:29, had been sent to England; and that from the London Price Current, it did not appear to be an article of profit to the Company; and they, therefore, suggested the propriety of discontinuing the purchase, or reducing the price to two, and one rupee per pound. The Government, in reply to this date, directed purchases to continue; and in this deter-

* Memoir on the Bengal Cochineal, by Dr. N. Fontana.—Asiatic Annual Register, vol. i., 1801.

mination the Court of Directors expressed their concurrence in the following terms:—"As the prices which we have obtained for the Cochineal on sales have not been such as to reimburse the prime cost and charges, our sole reason for continuing to suffer a considerable annual loss upon this article, has been with a view to encourage the breeding of the insect, until it should become perfectly understood among the natives."

In 1807, Mr. William Webbe, of the Madras Civil Establishment, suggested through Dr. Anderson to the Governor in Council, the expediency of advertising a reward for the introduction of the Grana Fina, or real Mexican Cochineal, into India. The Court of Directors concurred in the reward offered by the Indian Government of two thousand pounds for this purpose.*

The details which have been given with respect to the Pepper and Cochineal cultivations are important, as showing that, even with the greatest energy in individuals, and the utmost necessary patronage in the Government, success is unattainable, unless equal precaution be taken with every part of an experiment. Here the utmost degree of success was obtained that was possible with the materials. The plants succeeded perfectly, but it is doubtful whether any of them was the true Cochineal-Cactus of Mexico; and, in fact, the Insects (certainly the inferior kinds) preferred the Cactus already in India to that which had been procured expressly for them, though this was found an excellent remedy for scurvy, and a vegetable for voyages at sea. The Grana Sylvestre Insect—unfortunately the only kind procured—being one-third only of the value of the Grana Fina, while the expenses of its cultivation, collection, and drying, were necessarily the same; the price also paid for the Insect being high, because intended as an encouragement in the first instance, made this culture, like all ex-

* Measures which have been pursued by the Court of Directors and the Government of India with a view to the introduction of the True Cochineal Insect into the British Territories in India.—Trans. Asiat. Soc. of Calcutta, vol. vi.; Appendix, p. 85.

perimental ones, more expensive than would be necessary when success was established. The results also appear more unfavorable than they actually are. The Cactus, instead of requiring the best grounds and garden culture, will flourish in the most sterile parts of the country, needing but little subsequent attention; and as women and children may be employed in the care and collection of the insect, the expenses should, therefore, not be great. The experiment was so successful with the Grana Sylvestre, that no doubt can be entertained respecting equal success with the Grana Fina Cochineal, whenever it can be introduced; and this, with the same care and no greater expense, would be so much more valuable as a dye, and as an article of commerce.*

With regard to the Pepper Cultivation, we have seen that complete success was not attained; in fact, as far as a profitable culture was concerned, the Pepper Plantation at Samulcottah was a failure. Every thing, however, appeared favorable, for the Pepper of the Hills was pronounced by dealers to be of excellent quality: the Garden was established close to where the plant was indigenous; and Dr. Roxburgh was a most careful, and at the same time skilful Superintendent; but at that time, never having seen the true Pepper plant, he mistook for it a nearly allied species, yielding excellent Pepper, but which for the reasons stated (p. 65) was more difficult of culture. Dr. Heyne, however, (v. infra,) has given a different reason for the want of success in the culture. He succeeded Dr. Roxburgh in the charge of the Pepper Plantations, and, having afterwards an opportunity of visiting Bencoolen, he made particular inquiries respecting the culture of Pepper in Sumatra. He learnt that the Malays plant the Pep-

* It is not easy to estimate the expenses of the experiment, as so many small gardens were established in different parts of the country: but those of the principal one at Marmalong, near Madras, were restricted to 200 pagodas a month: £500 was paid to the brother of Capt. Neilson; and 13,397 pagodas, 17 fanams, and 20 cash, to Dr. Anderson, in 1795, for disbursements, on account of the introduction of the Cochineal and Silkworm upon the coast.

per vine at distances of five cubits in every direction, and support it on pieces of the Mootchy tree (Erythrinæ, sp.;) that the Pepper grew luxuriantly where it had much moisture, and hence the vallies were the most favorable situations for Pepper gardens. After the first planting in September the vine required but little attention, being left to its fate for twelve or eighteen months, when it received a peculiar treatment, which Dr. Heyne thinks, is the cause of its great fertility. The whole plant, with all its branches, being then *buried* in such a way "that only a small arch of the stem remains above ground." From this arch new shoots soon sprout out, three or four of which are allowed to climb up the prop tree, and are expected to produce flowers and fruit in a year after this operation. Dr. Heyne supposes, that by this practice the strength and vigor of the plant,—by the multiplication of its organs of nourishment, the roots—being so much increased, it cannot only produce large crops of flowers, but bring the fruit also to its greatest perfection. The omission of this practice, Dr. Heyne supposes, was the cause of failure at Samulcottah, as he says, "the plants that were raised from cuttings seemed indeed to thrive well, and soon produced blossoms; but such as had male flowers only. To account for this circumstance, we supposed that the hermaphrodite plant had been withheld by the people who sent us cuttings from their hills, where pepper is cultivated to a small extent, when, in fact, we had *starved our plants into celibacy*. (Tracts, p. 402.) It would be an interesting and very useful experiment, as well as one easily put into execution, in any of the Botanic or Horticultural Gardens favorably situated in India, to ascertain whether the Malayan treatment applied to the Pepper Vine of the Northern Circars would make it more fruitful.

At the same time that so much pains was bestowed on the cultivation of the Pepper, Cactus, and Cochineal, considerable attention was also directed to the culture of the Mulberry and the Silkworm, as well as to that of Sugar, and to the intro-

duction of Indigo. But as these were attempted in consequence of their success in Bengal, their notice may be deferred.

It is interesting to observe, that even at this early period the indefatigable Dr. Anderson was employed in sending "Mauritius Cotton Seeds," as well as "Brown Cotton Seeds," to different parts of the Peninsula. The latter had been brought from Malta to India by Major Macdonald, Governor of Penang, in 1796, who, in writing for some useful plants to be sent him, says, "I forward two boxes of plants from Mr. Smith, the Company's Botanist here, addressed to Dr. Heyne, Botanist at Samulcottah; No. 1, containing 360 plants of the India Rubber, and No. 2, 353 of the Dammar."

Dr. Heyne, so favorably known by his "Tracts on India," succeeded Dr. Roxburgh at Samulcottah, and afterwards acted as assistant to Col. Mackenzie, Superintendent of the Mysore Survey. He paid considerable attention to Botany, made a large collection of Plants, some of which are contained in the East Indian and Banksian Herbaria, and some were described by Roth;* but he chiefly studied Mineralogy, and his Tracts† are full of original information concerning the Rock formations, the Minerals, and Soils of the Peninsula. With respect to practical subjects, it is interesting to find him observing, that Potatoes were first introduced into the neighborhood of Bangalore and of Nundydroog by Col. Cuppage, and since 1800 by himself among the natives, whom, he says, "I was enabled by Government to supply with Seed Potatoes of the best kind from the St. Helena stock, and to offer them a sale for their produce, which, however, they soon found for themselves, in all parts of the country where Europeans reside.

* A. G. Roth, Novæ plantarum species præsertim Indiæ Orientalis ex collectione Doct. Benj. Heynii. Halberstadii, 1821.

† Tracts, Historical and Statistical, on India; with Journals of several Tours through various parts of the Peninsula, &c. By Benjamin Heyne, M. D., F. L. S., Surgeon and Naturalist on the Establishment of Fort St. George. London, 1814.

Since that time they have even supplied Madras, where their potatoes are preferred to those of Bengal."*

CULTURE OF THE POPPY IN INDIA.

Opium, so well known, and so extensively produced, need hardly be adduced as an instance of the physical capabilities of India for producing valuable commodities; were it not that the cultivation of the Poppy gives us an instructive lesson, not afforded by the other cultures successfully practised in India. Cotton, the Sugar-Cane, Indigo, and Pepper, are all indigenous products of the country, while the Poppy is a striking instance of the successful introduction of a valuable plant of more northern latitudes, into a hot country.

The history of the Poppy; and of Opium, its inspissated juice, are imperfectly known. Though extensively cultivated in India, the Poppy is also common in the gardens of England. Very good Opium has sometimes been prepared even in this uncertain climate, and in France and Germany it has been so very frequently. The Opium, so called Turkish, is chiefly collected in Asia Minor, and is exported to the extent of about 400,000 lbs. from Smyrna. It is produced at several places, at from ten to thirty days' distance in the interior; but that grown at Caisar, about six hundred miles from Smyrna, is the most esteemed for its cleanness and good quality. Besides this, other kinds of Opium are known in commerce, as that of Constantinople, and of Trebisond, as well as the Egyptian.

* Dr. Heyne not having had leisure to publish the results of all his observations, says, "I have in the mean time not been sparing in communicating my specimens to such as will be able to make them useful; and this, on the whole, was and is the primary object. It matters but little whether it be known by whom a thing is collected, provided it only be used for the good of the community. Many of my friends seem to be of the same opinion!" Tracts, Preface, p. vii.

The oldest notices of the Poppy are found in the works of the early Greek Physicians, where not only the plant, but also its juice, is mentioned. Opium, however, does not appear to have been so generally employed as in modern times, or the notices respecting it would have been more numerous and definite. It seems also probable that it first came into extensive use in Egypt. But, from having been so long and so generally cultivated in Europe, and the northern parts of Asia, the Poppy has spread, and become so completely naturalized in different countries, that it is now difficult to ascertain where it was originally indigenous. But, extensively as it is cultivated in India, it is remarkable that nowhere are even a few stray plants to be seen in a wild state; a sufficient indication that it is not a native of the country. This supposition is still further confirmed, by no other species of Poppy being found in the plains, though the Author discovered one in the mountains, and Mr. Griffith has sent the seeds of a species of wild Poppy from Caubul. The names of the Drug seem also to assist us in tracing its origin to countries beyond India. *Opium* is, no doubt, derived from the Greek *opos*, (juice;) which may also be the origin of the Arabic *afioon;* and this latter, of the Hindee *aphim.* According to Professor Wilson, the only S.nscrit term for Opium, is *ahiphena;* this occurs in the Medical Dictionary, called the "Raja Nighanta," and has every appearance of being borrowed and adopted from the Arabic term. By the Chinese, as we learn from the Memorial of Heu-Naetse, Vice President of the Sacrificial Court, it is called *Afooyung* in the Materia Medica of Le Shechin, of the Ming dynasty.—(Correspondence relating to China, 1840, p. 156.)

The Poppy, not being a native of tropical countries, is not cultivated in India during the seasons which are characteristic of those climates, that is, during the hot weather or rains; but in what are the winter months of European climates, namely, from October and November to March. The great heat is then sufficiently reduced to allow of the successful cultivation, not only of this, but also of other valuable plants re-

quiring only the summer heat of northern latitudes; such as Wheat, Barley, and European Kitchen-garden Vegetables. As low temperatures enough occur throughout the plains of India, the Poppy may be successfully cultivated from Behar, even to the banks of the Sutlej, or in the several independent states of the partially elevated table land of Central India, which are usually comprehended under the name of Malwa. The Behar, or Patna Opium, has long been esteemed of the finest quality for the China market; but that of Malwa, containing a large proportion of the narcotic principle, has rapidly attained almost equal value. For this it is probably indebted to the climate of Central India; but the north-western provinces could no doubt produce it of as fine a quality; since a specimen prepared at Bareilly was found to contain the largest proportion of the narcotic principle. Some Opium prepared by the Author at Saharunpore, was pronounced equal to the best Turkey, for medical purposes, and this was very similar to some procured in the Himalayas. The latter is grown there much later in the season, and collected nearly in the same months as in Europe and Asia Minor, that is in May and June. It can, no doubt, be prepared of the best quality for the European market, both in the hills and plains, whenever it is thought desirable to do so.

Though in the preparation of many of the valued articles of commerce, the Hindoos preceded most nations, yet they have usually been surpassed, whenever European skill and energy have been applied to the improvement of these very discoveries. It is remarkable, therefore, to find that with Opium they should have attained complete success, and this, too, without the aid of European science. But in the preparation of Opium, nature does everything, and man has only to wait patiently and carefully to collect the secretions of her laboratory.

The cultivation of the plant, however, requires some degree of attention, such as good soil, manure, and also careful management of the irrigation. The strength of the juice depends upon the quantity of moisture, and also, as Dr. Butter has

shown, upon that of the dew which falls upon the surface of the capsule. A deficiency of dew prevents the proper flow of the milk, while an excess, besides washing off the milk, causes additional mischief, by separating the soluble from the insoluble parts of the Opium. This deteriorates its quality, as well as increases the quantity of moisture, which must afterwards be got rid of. This, together with the adulterations practised by the Ryots, causes the chief difficulties experienced by the Opium agents.

This dependence upon the state of the atmosphere will in many cases explain the greater or less facility experienced in the preparation of Opium of the best quality in different parts of India. Also, why though the soil being less fertile, it is easier to prepare Opium of fine quality in Malwa and the north-western provinces of India, than in Bengal. But the history of the Opium culture is as instructive as that of Indigo, though in a different way. The latter being an indigenous plant, has continued to be cultivated by the natives according to their own methods, while the manufacture of its dye has been improved by the application of European energy and science.

The Poppy, on the contrary, is a foreign plant, successfully introduced by the natives themselves, of which the produce requires care, but not science on their parts. It is well calculated though, to show the important results which may follow the introduction of a plant, suited to the soil and climate of a country. When the Poppy was first cultivated in India, is not known, but it had attained considerable importance in 1786, as there is a memorial of the Marquis Cornwallis of that date, respecting the best mode of deriving a revenue from Opium. In 1826, the Finance Committee estimated that the government might derive from it about £1,000,000 yearly of revenue.

The Poppy has been adduced as a remarkable instance of a foreign plant successfully cultivated in India, but chiefly on account of the lessons which may be drawn for the culture of

other plants from similar climates. For we are led to inquire whether it be so peculiar in nature, as to be the only useful plant from similar climates cultivable in India, or whether it may not rather be an instance which may be successfully imitated. Therefore that other plants, as important as articles of commerce, which like it succeed in the summer of European climates, may with equal success be introduced into the cold weather culture of the plains, or into the summer culture of the mountains of India.

ART. XXXII.—DETECTION OF ARSENIC.

By H. Braconot.

Having occasion, some time since, to search for arsenic in a jelly mixed with other food, I employed the ordinary means, that is, I boiled the suspected matter for a long time with water, and having separated the fat, attempted to filter; but I was able to obtain but a very small quantity of clear liquor. This was divided into two parts; to the first I added a solution of sulphuretted hydrogen, which did not alter the transparency, even with the assistance of hydrochloric acid and heat. Nevertheless, the liquid had assumed an orange yellow, which caused the suspicion that sulphuret of arsenic was held in solution by the gelatine. In fact, having ascertained that arsenious acid is soluble in alcohol, I poured a sufficient quantity of this liquid upon another portion of the filtered liquor. The gelatin was separated, and the alcoholic liquor, tested with sulphuretted hydrogen, gave an abundant precipitate of orpiment.

We know that sulphuretted hydrogen, although a very delicate reagent to detect minute quantities of arsenic, does not offer the same amount of certainty when organic matter is present. To obviate this inconvenience, it has been proposed

to use oxidising agents to destroy these, and to convert the arsenious into arsenic acid; but, besides these modes being very tedious, the new arsenical products generally present more difficulty in the endeavor to reduce the arsenic, than when we act on the arsenious acid itself.

Therefore it is proper, under many circumstances, to treat the organic matters containing small quantities of arsenic, first, by ebullition in water, and reduce the liquid to a small bulk; and afterwards add alcohol; we would then obtain a liquid which, no longer viscid, would promptly pass the filter, and in which reagents would readily reveal the presence of arsenic. The same alcoholic arsenical liquor may be introduced into Marsh's apparatus, without producing the frothy effervescence which always takes place when animal matter is present. In fact, we know, that to obviate this effect Marsh himself has proposed to pour upon the surface of the liquid some drops of alcohol or of oil.

Journ. de Pharm.

Nancy, November 13*th*, 1840.

ART. XXXIII.—CHEMICAL AND MEDICAL EXAMINATION OF THE BARK OF MONESIA. By MM. Bernard Derosne, O. Henry, and J. F. Payen.

We are still uninformed as to the true vegetable which affords Monesia bark; the individual who has made it known to us, and who lived a long time in South America, having frequently had the opportunity of seeing its extract employed empyrically, succeed in serious diseases of the alimentary canal, especially dysentery, determined to bring it to Europe, in order to permit its properties to be studied. From specimens with which she has favored us, we have become acquainted with this bark. But she has not been enabled to communicate any information with respect to the family or genus to which the tree belongs. We have made research in all the Pharmacopœias and principal botanical works—have run over the collections of the Garden of Plants—have visited the conservatories of this great establishment, and finally, we have sought for information from persons especially engaged in natural history, and more particularly with woods and barks; in stating the result of our investigations, it will be judged whether it is our fault that we have not removed the obscurity which at present hangs over the origin of Monesia.

Monesia bark must be produced by a large-sized tree, for it is in pieces, some of which present a thickness of from six to eight millimetres; it is very compact, heavy, hard, and gorged with extract; its color is deep brown, when retaining its whole thickness; one of the surfaces presents a sort of grayish epidermis, which contrasts with the chocolate color of the cut surface; its fracture is short and not fibrous, as that of oak bark, cinchona, &c.; its taste is sweet at first, and sugary, but soon after becomes acrid and irritative to the throat.

The name under which it has been presented to us is Monesia, and at the start, we should state that it has no connection with the genus monetia, or manetia, of the family of Rubiaceæ. The unsatisfactory information transmitted to us, has induced us to suppose that the tree which furnishes it may be a *Chrysophyllum* of the family of *Sapoteæ*, yet this opinion has met with several opponents, in the number of which, we believe, we may count MM. Guillemin, and Lemaire Lizancour. M. Guibourt having received from different persons some pieces of a bark known by the name of *buranhem*, has supposed that he recognised it as Monesia; he thinks, also, that the extract which has been sent him under the name of *Extract of Mohica*, by M. Martins, may, indeed, be produced by the same bark; the same as that to which M. Isid. Bourdan has devoted an article in the *Journal des Medicins*, published in 1835.

Other travellers have thought that Monesia might be the bark of the *Rhizaphora gymnorrhiza*, L., the *Bugiera gymnorrhiza*, Lam. But other information induces us to believe that this opinion is not well founded. It has also been suggested, that the *Cortex braziliensis* of the Pharmacopœia, (*Acacia cochleocarpa, Martins,*) may be the same; but the description of this bark presents no analogy with that of Monesia. There is, moreover, the bark of the *Acacia virginalis*, *Cortex braziliensis* of the Lisbon Pharmacopœia, to which our bark presents some resemblance, although, in fact, it is different.

We think, then, that it will be premature to attribute Monesia to any vegetable, as we are of opinion that new information is necessary, and this we will omit no opportunity of obtaining; but the doubt under which we now labor, imposes the necessity of retaining the name of Monesia, under which the bark has been transmitted to us, and we do not participate in the fears of M. Guibourt, with respect to the inconveniences of a synonym, when the real name of the vegetable which affords it is discovered.

Chemical Examination.

The extract of Monesia which has been sent us, is in cakes of about 500 grammes, with the thickness of twenty to twenty-five millimetres, of a deep brown, almost black; it breaks readily, and its fracture presents neither the dull brown of catechu, or the brilliancy of kino; it is entirely soluble in water; its taste, in the first instance sugary, soon becomes astringent, and then leaves in the throat well marked acridity, remaining for some time.

The chemical examination of the bark, previously made, afforded the following soluble principles: 1st, chlorophylle; 2d, vegetable wax; 3d, a fatty crystallizable matter; 4th, glycyrrhizine; 5th, an acrid matter a little bitter; 6th, a little tannin; 7th, an organic acid not studied; 8th, a red coloring matter, closely resembling that of cinchona; 9th, phosphates of lime and magnesia; 10th, a salt of lime with the organic acid. The comparison of the imported extract, and that prepared for this analysis, has evinced their entire identity, with the exception of some differences which appertain more or less to the modes of preparation. A short time after the reading of this analysis to the Society of Pharmacy, M. Heydenreich, a pharmaceutist of Strasburgh, examined, at the request of Prof. Forget, a small quantity of the bark of Monesia, which he had from us: the results of our co-associate are the following:

The ligneous residue, which constituted five-eighths of the bark, when treated successively by cold water, boiling water, and ether, being reduced to ashes, has shown the presence of carbonic, sulphuric, and chlorohydric acids combined with much lime, potassa, and a little iron and silica.

The extract was composed of

Tannin, becoming blue with iron,	52
Gum or mucilage,	10
Sweet matter,	36
Loss,	2

We have repeated our first analysis to render it complete; the following is the result of our second effort.

Chemical Analysis.

Monesia bark in powder, exhausted by water in a displacement apparatus, affords a liquid of a reddish brown; acid, as regards litmus paper, having a taste at first sugary sweet, then styptic, bitter, and very acrid. This liquid affords a pale yellow precipitate with tartar emetic, a grayish brown with acetate of lead; gelatine forms with it abundant yellow flocculi, and the sulphate of iron a bluish black precipitate, like that of the substances containing tannin with iron. The liquid evaporated by a mild temperature to dryness, left 24 to 25 per cent. of a reddish brown extract, the appearance of which resembled catechu or kino. This extract is soluble in alcohol and in water, with the exception of a small quantity of apothema of tannin, formed during concentration.

To isolate the different principles contained in Monesia bark, we have followed the common method, which consists in acting upon it with different menstrua, such as sulphuric ether, alcohol, water, hot or cold, acids, &c.; and for these operations we have employed the displacement apparatus.

Treatment by Ether.

Sulphuric ether, after having acted upon the powdered bark of Monesia for several days and exhausted it, assumes a greenish yellow tint; distilled then to $\frac{19}{20}$ths it leaves a deep green residue, which separates from a liquid part, which is yellow and sugary. If this residue be treated with cold water, the greenish substance is isolated, which appears formed of wax and chlorophylle, besides a crystallizable fatty substance.

Chlorophylle and Wax.

This chlorophylle has been isolated by aid of cold alcohol, or of water slightly alkaline; it was soluble in ether and boil-

ing alcohol, with which it formed solutions of an intense green; after evaporation there remained a green substance, very fusible and a little solid.

Crystallizable Fatty Matter.

This substance dissolves in alcohol, and crystallizes by spontaneous evaporation in pearly laminæ; it is fusible at 32° or 34°, Centigrade; forms a pretty fixed web upon paper; potassa saponifies it easily; it appears to us to present the characters of stearine; the proportion of it was not great.

Sugary Matter, (Glycyrrhizine.)

The proportion removed by ether, and separated from the residue by means of water, was filtered carefully, and gently evaporated; it gave a product a little reddened, pulverulent, uncrystallizable, having the sugary taste of liquorice well marked: this substance presented to us all the characters assigned to glycyrrhizine.

Dissolved in water, and in the first place freed from all traces of tannin, by means of small layers of softened parchment thrown into the solution, it afforded a fluid, not capable of fermenting, of a very sweet taste, like liquorice, and in which potassa, acetate of lead, and especially chlorohydric, phosphoric, sulphuric and other acids, produced abundant gelatiniform deposits.

The precipitate produced by sulphuric acid, added in notable proportion, was collected on a fine piece of linen, and carefully drained; it was pulpy and brownish. We allowed it to remain in contact, for some days, with sulphuric ether, in order to separate it as much as possible from the excess of sulphuric acid. At the end of this time the ether had allowed to separate pearly crystals, and the precipitate itself had upon its surface a like crystallization; this precipitate, separated from all the ether, and dried by free hot air, was carefully treated with carbonate of baryta; we finished by carefully drying this mixture; we then heated it with alcohol;

this menstruum removed the sugary matter, which we regard as glycyrrhizine, and which remained, after filtering and evaporation, under the form of a dry matter, reducible to a slightly reddish powder.

Alcoholic Treatment.

To the action of sulphuric ether we made succeed that of hot alcohol at 30°; the clear liquid obtained was permitted to stand some days in a closed vessel, when it afforded a powdery precipitate of a rosy white; this was collected and immediately examined.

The alcoholic tincture was sensibly acid to blue paper, of a deep brown color, like the solutions of catechu and kino; its taste in the first instance was styptic, then bitter, and very acrid to the throat.

After distillation, pushed to dryness, we had as a residue a deep brown extract, very dry and friable, affording a dull brick dust red powder; this extract, when treated with cold water, was completely dissolved, with the exception of some flocks of brown apothema. The filtered liquid, tested by reagents, gave the following reactions.

1. With gelatine an abundant precipitate, without complete decoloration.
2. With tartar emetic a flocculose precipitate, *idem.*
3. With sulphate of iron a bluish black precipitate.
4. With potassa and ammonia a reddish brown gelatinous precipitate.
5. With the acids the liquid assumes a color somewhat reddish.
6. With lime and baryta a precipitate is formed, of gelatinous consistence, and reddish.
7. With acetate of lead, the same.

A portion (A) of the extract was weighed with care in a state of dryness, then dissolved in distilled water and filtered; there remained upon the filter a small quantity of brown powder, again the apothema of tannin. In the clear reddish

orown acidulous liquid, of styptic taste at first, then very acrid, we placed fragments of parchment, previously well washed and softened.

Tannin, or Tannic Acid.

After forty-eight hours the organized membrane was swollen and hardened by the combination with tannin. This having been accomplished, the liquid no longer evinced tannin with the sulphate of iron. This was filtered anew, at the same time washing the parchment, and evaporated to dryness without loss. The difference of weight of the dry extract, with that which it possessed originally, indicates nearly the proportion of tannin. The extract still preserved its brown color; it was acid from malic acid, and its acrid taste was well marked.

Red Coloring Matter—a kind of Cinchona Red.

The residue, treated by alcohol, at 25°, completely dissolved in this menstruum. An excess of slacked lime was then added, in fine powder, or acetate of lead, and immediately there was formed a rose gray precipitate, or wine dregs, produced by the combination of coloring matter with the oxide of calcium or that of lead.

This substance, which very much resembles what is found in catechu, in kino, and especially in the bark of Peru, (red cinchona,) was disengaged from its combination with the oxide of lead by means of sulphuretted hydrogen and the proper treatment. It was of a reddish brown color, little soluble in strong alcohol, more so in water or alcohol, at 25°. Its taste was slightly acrid; and under the influence of potassa, it appeared capable of precipitating tannin like gelatine, and becoming black with the sulphate of iron; properties recognised by MM. Pelletier and Caventou in the red insoluble matter of cinchona.

The alcohol, scarcely colored, retained an acrid substance, which we proceeded to examine, and which remained after the most cautious evaporation of the menstruum. When the

hydro-alcoholic extract of Monesia, made directly with the powder, not treated beforehand with sulphuric ether, is employed; and when the tannin is separated by means of parchment, as has been stated above, we can readily obtain glycyrrhizine, with the characters described. To do this, it is necessary to act upon the product, freed from tannin and brought to a dry consistence, with hot alcoholized sulphuric ether; the vehicle leaves the sugary principle by its evaporation, and the acrid and coloring matters are afterwards obtained.

Acrid Matter—Monesine.

The product which is now about to occupy us, is doubtless one of the most important contained in Monesia bark.

Having recognised in the portion A, the existence of other principles, and having examined them in part, we have, in the portion B of the extract, endeavored to isolate only the acrid substance.

To this end, the extract dissolved in hot alcohol at 25, and filtered, was treated with an excess of lime reduced to fine powder. The decoloration was complete, and the filtered alcoholic liquid was subjected to a slow and careful evaporation to complete dryness. The residue was submitted to pure water, and filtered, after which it was evaporated anew with the same precautions.

The product obtained constitutes the acrid matter of Monesia, for which, at present, we shall retain the name of *Monesine*, which, in the first instance, we have bestowed upon it, although it has considerable analogy to saponine, and also to polygalic acid, &c., as we shall demonstrate.

This acrid matter, dried at 20, presents the appearance of transparent plates, slightly yellow, very friable, like dried gum. It is easily reduced to a white powder, readily dissolves in alcohol and water, hardly in sulphuric ether; it communicates to water the property of frothing considerably. By no means of evaporation, either in the atmosphere, or in a vacuum, could we make it crystallize, for the solutions dried

spontaneously upon pieces of glass, have not allowed to be perceived by the microscope any sign of crystals.

The solution of this matter does not saturate acids; it has no odor, but its taste, at first a little bitter, soon occasions in the throat the feeling of *acridity*, which is well marked and very persistent. By means of nitric acid it is soon converted into a yellow friable substance, almost insoluble in cold water, but very soluble in alcohol, presenting much bitterness, and leaving, after spontaneous evaporation, a yellow residuum in pearly leaves, with somewhat of a crystalline aspect. This product appears to be similar to the resin which M. Henry announces he has obtained in the reaction of nitric acid with esculic acid; perhaps it is analogous to nitro-picric, or carboazotic acid?

When we compare the different physical and chemical characters of the acrid principle of Monesia, there will be found a close resemblance between them and those of *saponine*, *polygalic acid*, and even, although more remotely, with *salseparine*.

We have examined anew these characters, in specimens of *saponine*, *polygalic acid, and salseparine*, which we have ourselves prepared, or for which we are indebted to MM. Busy, Quevenne, and Thubeuf; and the results obtained with muriatic acid, potassa, and nitric acid, are very close.

It is very probable, that if we can obtain, in succession, these different substances, well crystallized, or exempt from all the foreign matter which accompanies them, that the analogy will be complete. The fear of not obtaining the acrid matter of Monesia to submit it to elementary analysis, has so far prevented us from essaying this proof, which might then demonstrate its close alliance with *saponine*. Saponine, undoubtedly, is an immediate vegetable principle, appertaining to different vegetables, and not restricted to the saponareæ; the same occurs in other vegetables, as, for instance, in the case of asparagine, cafeine, piperine, &c., found in the individuals of families removed from each other.

Some years have elapsed since one of us has isolated, with

Boutron Charlard, from the bark of the Quillaia saponaria, an acrid matter, which, to a certain extent, presents an analogy with saponine. (*Journ. de Pharmacie.*)

Malate of Lime.

We have stated previously, that the hydrochloric tincture of Monesia allowed to deposit, at the end of some time, a pretty abundant rose colored or whitish precipitate. Desirous of knowing the nature of this deposit, we in the first place boiled it with alcohol, at 35°, to deprive it of all coloring matter. It was then drained and dried, when it was treated with warm water sharpened with sulphuric acid; after proper boiling, a little animal black was added; it was filtered, boiling, and the half of the liquid, when evaporated, left, with sulphate of lime, a white salt, which was destroyed by calcination in the atmosphere, leaving a little carbon and carbonate of lime; the other half, by the addition of acetate of lead in sufficient quantity, furnished, cold, a white precipitate. This precipitate, washed and drained, boiled with water, and filtered boiling, afforded, by evaporation, small needle-shaped crystals, recognised as *malate of lead.*

This salt, brought in contact with sulphuret of barium, dissolved in water, gave rise to sulphuret of lead and a liquid, from which was obtained, by means of the careful addition of sulphuric acid, the malic acid with its characteristic properties.

Treatment by Water.

After finishing with ether and alcohol, we submitted the bark, in great part exhausted of its principles, to the action of distilled boiling water; the fluid, however, still removed some red coloring matter, traces of tannin, of acrid matter, glycyrrhizine, &c., but no fecula. The liquid contained gum, or a principle of this kind, and some salts of potassa, as the sulphate, chloride, and malate.

Insoluble Residue from the preceding Treatments.

The ligneous portion resulting from these different treatments was still reddish, it was submitted—1st, to the action of dilute muriatic acid; 2d, to potassa; and 3d, to calcination.

Earthy Phosphates, and Malate of Lime.

By means of acidulated water, we isolated a certain quantity of calcareous salts, which were precipitated by saturating the acid by ammonia in excess,—the deposit contained malate of lime, which was easily recognised; and after its calcination, we found phosphate of lime mixed with traces of phosphate of magnesia.

Pectine, or Pectic Acid.

In treating the residuum by the alkaline water from pure potassa, we have separated, among other distinct substances, *pectine*, or *pectic acid.*

Oxides of Iron and Magnesium.

Finally, the residuum, submitted to two treatments and well washed, was calcined, to destroy all the ligneous fibre, which constituted the greater part of it. There remained some traces of phosphate and carbonate of lime (coming from the malate) not removed by the acid, oxide of iron, and traces of manganese and silica.

Aromatic Principle.

A certain quantity of Monesia was distilled with water, and the product cohobated several times; the liquid collected had scarcely a sensible odor. Agitated with pure sulphuric ether, and this vehicle separated by decantation, we had, after complete evaporation, a residuum slightly greasy to the touch, almost imponderable, and of a peculiar aromatic odor; the very smallest proportion of this product, in other respects

without real importance, hindered us from pronouncing upon this point.

It results from the experiments which we have presented, that Monesia bark contains in the hundred parts of dry bark,

1.	Aromatic principle? Imponderable traces.	
2.	Crystalline fatty matter, Chlorophylle and wax, } stearine.	1.2
3.	Glycyrrhizine,	1.4
4.	Monesine, (or acrid matter resembling saponine,)	4.7
5.	Tannin, or tannic acid	7.5
6.	Red coloring matter, resembling that of cinchona or catechu,	9.2
7.	Gum, a small quantity,	not appreciated.
8. 9.	Malic acid, Malate of lime,	1.3
10.	Phosphate of lime, " of magnesia, Sulphate of potassa, Chloride of potassium, Malate of potassa, Oxides of iron, manganese, silica,	3.0
11. 12.	Pectic acid, or pectine Lignin, or ligneous fibre, Loss,	71.7
		100.0

Pharmaceutical Preparations.

The pharmaceutical forms under which Monesia at the present time has been used, are the following:

1, an extract obtained by water; 2, a syrup; 3, a hydro-alcoholic tincture; 4, a pommade; 5, the acrid matter, or *Monesine.*

Extract of Monesia.

We have prepared this extract by exhausting the bark in coarse powder with water, by means of a displacement appa-

ratus, and evaporating to the consistence of a dry extract, by means of steam or a salt water bath.

Simple Syrup of Monesia.

℞.	Syrup of white sugar,	9 k. 800 grs.
	Dry extract of Monesia,	100
	Pure water,	100

This syrup contains one to 100 of its weight of extract of Monesia, (six grains to the ounce.)

Compound Syrup of Monesia.

℞.	Simple syrup of Monesia,	1 killogramme,
	Extract of white poppies,	16 decigrammes.
	Orange flower water,	30 grammes.

Hydro-alcoholic Tincture of Monesia.

℞.	Extract of Monesia,	500 grs.
	Pure water,	7 k. 500
	Alcohol, at 34°,	2 . 000

This tincture contains five per cent. of its weight of extract (30 grains to the ounce.)

Pommade of Monesia.

℞.	Oil of sweet almonds,	4 P.
	White wax,	2
	Extract of Monesia,	1
	Water,	1

Monesine, or Acrid Matter.

Monesine is obtained by exhausting the bark with hot alcohol at 25; to this tincture is added an excess of slacked lime, in fine powder; by agitation, the liquid is decolored; a magma is formed, of a reddish brown color, which retains the coloring matter and tannin, the glycyrrhizine, malic acid, &c., combined with lime; the alcohol retains the Monesine in solution. It is necessary to distil this clear liquid, evaporate to

dryness, and redissolve the residue by means of cold water, to which a little animal charcoal is added. By filtering, and bringing it to the dry state again, by means of the salt bath, a yellow friable product is obtained, which, when reduced to powder, constitutes Monesine; with this powder can be prepared all the medical formulæ, as pills, syrup, pommade, &c.

Medical Employment.

From the information furnished by chemical analysis, and from the observations made upon healthy subjects, and especially from the knowledge of the diseases in which the natives of the country where Monesia grows employ this substance, it, in the first place, has been employed in affections characterized by general or local atony, sanguine or serous discharges, and it is only by analogy that it has been tried finally in other diseases.

Administered by the stomach, Monesia has been useful in hæmoptysis, menorrhagia, debility of stomach, dysentery, scorbutic disease, scrofula, and especially diarrhœa. It has been tried with various results, in bronchitis, phthisis, leucorrhœa, enteritis, &c.

The topical employment of Monesia has produced advantageous results in ulcers of different parts of the skin, and of different characters. It has succeeded in stomatitis, ophthalmia, hæmorrhoids, fissures of the anus, ulcerated chilblains, &c.

As regards the mode of administration, the extract of Monesia is given in the dose of 16 to 24 grs. daily in ordinary cases; in more rebellious cases, as menorrhagia, and profuse diarrhœa, it may be necessary to give from 40 to 60 grs.; finally, in constitutional affections, as scrofula, it is requisite to augment progressively the dose during thirty or forty days, and to attain four grammes or more of the extract daily.

Monesine has heretofore been administered, but once internally in the dose of 16 centigrammes; and externally it has

been employed with advantage to stimulate atonic ulceration, which it does more actively than the dry extract.

We must here conclude our remarks upon the employment of Monesia, and will reserve ourselves for further development in a journal specially medical.

Journ. de Pharmacie.

ART. XXXIV.—ON THE PREPARATION AND USE OF THE SESQUI-IODIDE OF IRON. By OBERDŒRFFER, Pharmaceutist at Hamburg.

THE author proposed to replace for medicinal use, the protiodide of iron, which is very alterable, by the sesqui-iodide, which may be preserved for a long time without alteration, and which he obtains in the following manner. He causes 16 grammes of iodine to act upon 6 grammes of iron in 32 grammes of water, until the iodide of iron is formed; the liquor is then filtered and diluted with 128 grammes of water and 8 grammes of iodine added, which readily dissolves; finally, sufficient water is added to make up 320 grammes.

Eight grammes of this medicine represent 43 centigrammes of iodine. It produces the same effects as the iodide, but is more active, and should be given internally in less doses. The best form for its use is that of syrups.

Journ. de Pharm.

MINUTES OF THE BOARD OF TRUSTEES PHILADELPHIA COLLEGE OF PHARMACY.

At a stated meeting of the Board of Trustees of the Philadelphia College of Pharmacy, held Fifth mo. 17, 1841, the following letter from Dr. Bache was read, accepted, and referred to Warder Morris, Dillwyn Parrish, and Samuel F. Troth, with instructions to prepare the proper resolutions on the occasion, and report to the next meeting.

April 15th, 1841.

"To Henry Troth, Esq., Chairman of the Board of Trustees Philadelphia College of Pharmacy.

Dear Sir,—Having recently accepted a Professorship in the Jefferson Medical College, the arduous nature of my new duties makes it necessary that I should retire from the service of the Philadelphia College of Pharmacy. I therefore respectfully tender to the Trustees my resignation of the Professorship of Chemistry in the College.

In taking this step, which dissolves my connection as a teacher with the College, I cannot omit to express my high sense of the importance of the objects of its members, and my ardent hope that the Institution may have a long career of prosperity.

Very respectfully,
Your obed't servant,
Franklin Bache."

The Board then proceeded to nominate candidates for the Professorship of Chemistry, vacated by the resignation of Dr. Bache; and on motion, it was

Resolved, That a special meeting of the Board be called on the 31st inst., at 8 o'clock, P. M., in order to proceed to the election of a gentleman to fill the chair of Chemistry of the

College, and that the Secretary be requested to notify the members of the object of the meeting.

Fifth mo. 31st, 1841.

At a special meeting, called pursuant to direction of the Board at the last stated meeting, held this evening, the object of the meeting being stated by the Chairman, on motion, the Board proceeded to ballot for a Professor of Chemistry, which resulted in the election of Dr. WILLIAM R. FISHER.

The Secretary was directed to notify Dr. FISHER of his election.

At a stated meeting of the Board of Trustees, held Sixth mo. 21, 1841, the following resolutions, reported by the Committee in reference to the resignation of Dr. BACHE of the Professorship of Chemistry in the College, were, on motion, unanimously adopted.

Resolved, That in accepting the resignation of Dr. FRANKLIN BACHE, as Professor of Chemistry in this Institution, the Board of Trustees, on behalf of the Philadelphia College of Pharmacy, desire to express their sense of the distinguished zeal and ability with which he has uniformly devoted himself to the interests of the College.

Resolved, That while they deeply feel the loss they have sustained, in being deprived of his valuable services, they rejoice that his sphere of usefulness will be extended in the new station which he has accepted, as Professor of Chemistry in the Jefferson Medical College.

Resolved, That in thus dissolving a connection which has subsisted for ten years, we desire to bear testimony to the high moral worth and suavity of manners which has marked the intercourse of the Professor of Chemistry with the mem- of this College, and to express our sincere desires for his future prosperity and happiness.

Resolved, That a copy of these resolutions be recorded on our minutes; and that the Secretary be requested to transmit a copy to Dr. F. Bache, signed on our behalf.

From the minutes of Board of Trustees,

Ambrose Smith, Secretary.

MISCELLANY.

Note on Minium.—Although minium has been the object of the researches of many chemists, opinion is yet divided as to the true mode of representing its composition, and even as to its analysis. Having occasion to examine several specimens, with regard to their commercial value, the observations that were then made, induced me to undertake the experiments, of which I offer here the following results; I do this with the more confidence, because they appear to me to afford additional support to the opinion which considers minium, not as an oxide distinct from the two oxides PbO and PbO^2, but rather as a combination of these two oxides in a constant and definite proportion.

The most important investigations which have been made, in a scientific point of view, with regard to minium, are those of M. Dumas, from which it results, that this product has always the following composition;

$$PbO^2+2PbO,$$

when properly purified and saturated with oxygen. It is likewise this proportion which I have constantly found in analysing miniums under new circumstances, and by the two different processes which I am about to describe.

The first consists in calcining, in a crucible of silver or platinum, a mixture of 100 parts of protoxide of lead, the product from calcined white lead, with 25 parts of chlorate, and 200 parts of nitrate of potassa; the object of this latter is, to give greater fluidity to the mixture, without increasing the amount of chlorate.

By operating in this manner, the action of the oxygen upon the oxide of lead is so efficacious, that it is changed into peroxide; this oxide may thus be procured with great facility. If we proceed farther, if the temperature be elevated to an obscure red, the effervescence diminishes, the mass thickens, and minium is perceived to form.* It is sufficient to boil

* It is necessary to continue the elevation of the temperature until it commences to decompose in some points towards the sides, so as to be certain that no peroxide remains. If the object is to prepare this latter oxide, it is necessary to withdraw the

the residue with a solution of caustic potassa or soda, and afterwards to wash it well to obtain pure minium, with the composition before indicated. The product is in a minute state of division, of a beautiful red, slightly bordering on orange, like the best miniums of commerce.

Minium may also be obtained in the moist way, by boiling, for one or two hours, a solution of an alkaline plumbate, with deutoxide of lead in fine powder;* the color of the deutoxide gradually changes, and finally becomes an ochreous red powder. This powder is nothing else but minium, commonly contaminated with a small quantity of deutoxide which has not been affected by the alkaline plumbate; it may readily be freed from this by digestion with a solution of oxalic acid, which destroys the deutoxide without attacking the compound, and the oxalate of lead may afterwards be separated by caustic potassa or soda. The product thus obtained, has always a red tinge, more deep than that of minium prepared in the dry way, but it becomes lighter, and approaches it more when triturated with water; otherwise, it has exactly the same composition as minium, and the difference in the tint appears due solely to the difference of texture; in fact, there is somewhat of a crystalline appearance in the minium obtained in the moist way.

My analyses were made by keeping the miniums in contact with an excess of nitric acid, of 15° B., for 24 hours, and shaking frequently, without any increase in the temperature, which would decompose a portion of the deutoxide, which dissolving even in small quantity, would color the liquid of a violet. It only remains, after this treatment, to dry the residue and weigh, taking care to ascertain that it is completely soluble in proto-nitrate of mercury, which has no action on minium.

The motives which induce me to admit, as the most likely, the opinion that minium is a combination of the two oxides, are the following:

Admitting that minium is a peculiar oxide, intermediate between these two oxides, the fact becomes inexplicable, that protoxide is, by calcination with chlorate of potassa, readily converted into deutoxide, while I have satisfied myself that minium cannot, in this manner, be changed into deutoxide.

crucible, when the matter has acquired a black tint, of a uniform color, which commonly happens with the proportions mentioned, when the whole mass of the mixture is in full fusion; it is thus easy to convert into pure peroxide, at least nine-tenths of the protoxide of lead used, by treating with nitric acid, the residue, after having been well washed. The peroxide of lead, thus obtained, is nearly black.

* We may employ the pure plumbate, but it is more convenient to use a solution obtained by dissolving in water five or six parts of crystallized nitrate of lead for one of deutoxide, to which is to be added caustic soda or potassa, in sufficient quantity to redissolve the hydrate.

Oxalic acid causes the deutoxide to pass immediately to the state of protoxide, but does not alter minium in the least; which is at the same time a good mode of purification, and characteristic of minium. Since this acid, as well as the proto-nitrate of mercury, and sulphuric acid, reduce the deutoxide to protoxide, and do not affect minium, it may hence be inferred, not only that minium is a compound of the two oxides, but it is also endowed with a remarkable stability.

Ann. de Chim. et de Phys.

Note on the Preparation of Tannin. By M. Duval.—To prepare tannin by our process, take, as in the usual mode, equal weights of nut galls and of ether. Expose these two substances in a glass or stone ware vessel, to a temperature of 15° or 20°, C.; after macerating for one month, the mixture having become a somewhat solid paste, place it in a strong cloth and submit it to pressure. The product obtained will be of the consistence of molasses, very adhesive to the touch, and does not disengage any portion of the ether which it contains at ordinary temperatures. If, having placed this mixture in an open vessel, we expose it to the sun, or in a stove, at the end of some time we will perceive the surface to become covered with efflorescence, while the rest of the mass maintains the appearance of a thick honey-like liquid, for more than six months.

To obviate this inconvenience, which retards the preparation of tannin, and affects its purity, by the deposition of foreign bodies contained in the atmosphere, it is necessary to submit the mixture to the action of an elevated temperature, of at least 120°, C. This temperature may be obtained in a very fixed manner, by means of a very concentrated solution of chloride of calcium. The chloride of calcium thus forms an excellent salt water bath, of very great service in many chemical preparations.

The apparatus which I use is composed:

1. Of an iron boiler, containing the muriate of lime.
2. Of a flat bottomed silver basin, (one of copper will answer if well tinned,) into which the tannin is to be placed. This latter is to be placed in the muriate of lime, which is to be raised to the boiling temperature. But to obtain a temperature of 120°, C., without burning the product, and without accident to the operator, it is necessary to take some precautions which are readily foreseen.

Having disposed the apparatus with suitable precautions, and having cautiously set it in operation, that portion of the ether which preserves the tannin in the state of a thick liquid will readily volatilise, and the inferior part of the mass touching the basin will be converted into brilliant, nearly white, very light scales, forming a mass of greater bulk than before. Meanwhile, the upper portion remains colored and transparent, because it

contains a large quantity of the ether which cannot be driven off, the heat not penetrating with sufficient power to this part. It is in this state that we find the tannin in commerce. But to render it white and light throughout the whole mass, it is proper to cover the whole basin with a plate of copper, on which some red hot coals are to be placed; then the same phenomenon, indicated above, will be perceived to take place, namely, the part remaining colored and transparent will increase in bulk, and become changed into very light white scales, as had happened in the portion touching the basin itself.

Ann. de Chim. et de Phys.

New Product.—A. Woulens, near Amiens, possesses a large cotton spinning establishment, which is lighted by means of oil gas. This gas on escaping from the iron cylinder filled with red hot coals, in which it is formed, traverses a reservoir of oil, in which it deposits a white liquid matter, which can be drawn off by a stopcock at the lower part of the reservoir. The workmen charged with its care having spread this matter on the water on the ground, it inflamed spontaneously, and running into a neighboring rivulet it spread upon the surface of the water, so that the whole appeared on fire. The proprietor of the establishment intends to send a flask filled with this singular substance to M. Gay Lussac for chemical analysis.

Journ. de Chim. Med.

New Active Principle. By MM. VANDAMME and CHEVALLIER.—There exists in the seeds of the ivy an alkaline matter, to which M. Chevallier, pharmaceutist at Amiens, and myself, have proposed during the past year to give the name of *hederine.* This substance is a very strong bitter, and appears to have a strong affinity with quinia in febrifuge properties, besides being an indigenous product like salicine.

Hederine is found in the seed of the *hedora helix*, and appears to exist as a super malate. The mode of separation is the same as that of the other vegetable alkalies, that is to say, treating with boiling alcohol, the hederine precipitated by hydrate of lime, and afterwards evaporating the liquor.—*Ibid.*

Use of Chloride of Lime in the Treatment of the Itch.—We have found in foreign journals, under the title of "New treatment of the Itch," by M. Raffael Napoli, the following article:

℞. Chloride of lime,	1 pound.
Water,	3 or 4 pounds.

Mix and digest for two hours, and then filter through linen.

Compresses are to be dipped in this solution, and applied to the parts affected; each compress is to be covered by a second, moistened in strong vinegar. The compresses are to be renewed as they become dry, and the application continued until the liquid is all used; about which time the cure will be completed. In some very rare cases, a continuance of the application is required.

We will observe that the treatment proposed by M. Napoli is not new, and that the use of chloride of lime against the itch was printed; and the following formula given in 1827, by M. Derheims, pharmaceutist at St. Omeers.

Dry chloride of lime,	3 ounces.
Common water,	1 pound.

Prepare a solution, to be used as a lotion for the arms and legs twice a-day. According to M. Derheims, the cure is effected in from six to ten days, which is a good result, as Dr. Mellier has proven that the duration of treatment in twenty cases was sixteen days. M. Derheims also states that the chloride prepared by passing chlorine through a solution of lime, and which contains an excess of chlorine, is more active, and produces more favorable results.—*Ibid.*

---

*Chemico-Legal researches on Morphia.**—Iodic acid has been offered as a test to indicate the presence of morphia; as this has the property of depriving the acid of oxygen, as thus liberating iodine. Davidson denies the utility on this point, after the following observations:

While examining, some months since, the urine of a patient, he ascertained that on adding a portion of iodic acid, the urine acquired the odor of iodine; and starch with it produced an azure tint. I then examined, says he, what element of urine possessed this property. I tried both urea and uric acid, and discovered that the latter only produced this effect, and could thus be recognized in the urine of healthy persons, as well as in that of the sick. I afterwards examined the effects of iodic acid on the serum of blood, and obtained the same effects, but more slowly, and the color was less deep than with the urine of persons in health. All the albuminous fluids which I examined gave the same results, the only difference being in the intensity of color. I observed the same facts with regard to the serum of the brain of a man dead of typhoid fever, in the liquid evacuated by paracentesis after peritonitis, of ascites, in the serum of the milk of a heifer, &c. The serum of blood, even when mixed with four or five parts of water, gave, with iodic acid and starch, the same color, but not so well as when undiluted.

* Rep. delle Scienze Fisico-Med. 1840.

It appears from these facts, that iodic acid is susceptible of being decomposed by substances which exist in abundance, as an element of nutrition, and as a constituent of the liquids and solids of animals. One of the secretions, urine, contains a substance which has the same effect. Hence, on analysing the substances contained in the stomach, in a case of poisoning by opium, the certainty of finding albumen, and the possibility of meeting uric acid, can render the separation of the morphia from these two substances but very difficult and complicated, and even doubtful, so that iodic acid can no longer be considered as a test for Morphia.

J. de F.

Journ. de Pharm.

Elixir of Vitriol.—Among the relics of old pharmacy retained in the French Codex, is the preparation known by the names of *Teinture aromatique*, *Elixir vitriolique de Mynsicht*, and *tinctura aromatica sulphurica.* Lest any of our young readers should confound it with with the aromatic spirit of ether of the Pharm. Lond., 1824, we will observe that the Parisan elixir is made without distillation. The French recipe is as follows:

Take of the root of sweet flag, an ounce; galangale, (*Galanga officinalis*,) an ounce; chamomile flowers, half an ounce: sage leaves, half an ounce; wormwood leaves, (*Absinthium officinale*,) half an ounce; curled leave mint, (*Mentha crispa*,) half an ounce; cloves, three drachms; cinnamon, three drachms; cubebs, three drachms; nutmegs, three drachms; ginger, three drachms; aloes wood (*Aloexyluma galochum*,) one drachm; lemon peel, one drachm: white sugar, three ounces; alcohol, two pounds; sulphuric acid, four ounces.

The solid substances are to be reduced to a coarse powder, then put into a matras, and eight ounces of alcohol poured over them. After forty-eight hours' maceration, the sulphuric acid is to be gradually mixed with them, and the mixture is to stand for twenty-four hours; the rest of the alcohol is then to be added.—*London Med. Gaz. from Med. Ex.*

Johnson's Syrup—The patent granted to the inventor for five years having expired, this syrup has become public property. It consists of an ounce of syrup of liquorice, forty-six grains of the fresh juice of asparagus heads, and the same quantity of the syrup of mallow.—*Ibid.*

On the preservation of Cantharides.—I wish to make known a process, which I have not seen described, by which, at the moment of collection, the life of the Spanish fly may be destroyed. This mode, which is very simple, consists in placing them in a bottle, or other vessel, and closing air-tight with cork, to expose them to the direct rays of the sun for some hours. The fuller the vessel, the sooner will asphyxia take place, as it is

produced more rapidly with the elevation of temperature; when we wish to act more rapidly, a few drops of ether in the vessel will effect this. By operating thus, it appears to me that the cantharides will be in better preservation than when destroyed by vinegar. I leave to my colleagues to verify this by experiment.—RIQUET, Pharmaceutist.

Journ. de Chim. Med.

The flowers of Krooso.—According to M. Abadie, (Theodore,) these flowers, brought from the moist countries of Abyssinia, belong to the family Malvaceæ, and are a remedy for tænia. The analysis of these flowers, made by M. S. Martin, have proven that they contain—

1. Amidon.
2. Saccharine matter.
3. Vegetable extractive.
4. Very odorous green resin.
5. Crystals soluble in water and in alcohol, having the property of reddening litmus paper.

Journ. de Chim Med.

On the Microscopic Constituents of Milk. By Professor NASSE, of Marburg.—After a careful microscopic examination of milk from pregnant and suckling women, as well as from a cow and a bitch, and a comparison of his results with those of Donné and other preceding observers, the author says that the following may be enumerated as the microscopic constituents of the normal secretion of the mammary gland: 1. The smooth, homogeneous, transparent oil-globules, to which, in addition to the common milk-globules, belong also the fine, scarcely-measurable particles, and the larger drops of oil which swim on the top of the milk. 2. The cream-globules, which are distinguished from the oil-globules by their opacity and their facette-like aspect. 3. The granulated yellow corpuscles. 4. The lamella of epithelium. 5. The more or less turbid medium, in which the four preceding kinds of corpuscles are suspended.

The first, the common milk-globules, are composed entirely of fatty matter, which dissolves completely and rapidly in ether. No membrane can be seen investing them. In the first nine days after delivery, the largest globules measure 1-200th of a line in diameter; afterwards they are as much as 1-100th, but many are found of a much smaller size; and through all periods of lactation, the microscope, as well as other means of examination, show that the proportion of oil-globules in the milk varies greatly in different persons and under different circumstances.

In perfectly fresh, warm woman's milk, no other globules than these are sometimes found. But as soon as the milk has stood for some time exposed to the air, other corpuscles are discernible in it, which are distinguished from the preceding by a greater definiteness, a less degree of

polish, and an appearance of facettes. In size they are nearly similar to the oil-globules; but if the milk be examined some time after it is drawn, a number are found much larger—1-50th of a line or even more in diameter. They are not so easily soluble in ether as the common milk-globules; they do not break up in drying, but they become clearer; acetic acid and ammonia have no influence upon them; they diminish for a time when the milk is boiled, but they re-appear gradually as it cools again; when left at rest, they collect on the surface and form the cream; they easily stick together, and butter is formed when they are collected in one homogeneous mass. It is evident that they acquire their peculiar characters after they they are drawn from the gland-ducts; for the author, as he watched them on the field of the microscope, could see individual globules which were originally clear, becoming on a sudden quite dark, and assuming the several characters of the cream-globules.

The yellow granulated corpuscles are almost peculiar to the colostrum; after the first few days from delivery, they cease to occur in the milk, and they disappear from it earlier in those who have borne several children than in primitive paræ. They are not all spherical; the majority are flat. Their diameter is at most from 1-200th to 1-100th of a line; some are found measuring 1-50th in length and 1-75th in breadth. They consist of small clear globules of fatty matter, which are connected together by a firm cement, which is unalterable by either ammonia or concentrated acetic acid, or by boiling. When the milk is left at rest, these globules collect on its surface; and, when they exist in considerable numbers, render it unfit for making butter. The author believes that they are not, like the preceding globules, formed by the action of the air; but that they are produced by the secreting surface of the gland-ducts, and are analogous to the mucus-cells which are cast off from the surfaces of many mucous membranes, and to which they are in many respects very similar.

Müller's Archiv.

THE

AMERICAN JOURNAL

OF

PHARMACY.

PUBLISHED BY AUTHORITY

The Philadelphia College of

EDITED BY

JOSEPH CARSON, M.

Professor of Materia Medica and Pharmac

AND

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ASSISTED BY A PUBLISHING COMMI

CONSISTING OF AMBROSE SMITH, PROFESSOR
ELLIS, PROFESSOR WOOD, PROFESS
AUGUSTINE DUHAMEL, WM. PROC
AND ELIAS DURAND.

VOL. XIII.
NEW SERIES.—VOL.
OCTOBER — NO. III.

PHILADELPHIA.
MERRIHEW AND THOMPSON, PRINTERS, NO. VII. CARTER'
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By direction of the Board,

HENRY TROTH, Chairman.

Ambrose Smith, Secretary.

October, 1841.

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THE

AMERICAN JOURNAL

OF

PHARMACY.

OCTOBER, 1841.

ART. XXXV.—OBSERVATIONS ON ASARUM CANADENSE, AND ASARUM EUROPŒUM. By WILLIAM PROCTER, Jr.

THE Asarum Canadense has been the subject of several writers in this country, whose investigations have gone far to elucidate its chemical history. Dr. Bigelow, in his Medical Botany, has given a short account of its chemical constituents, among which he ascertained the presence of light-colored, pungent and fragrant essential oil, a red bitter resinous matter, starch, and gum. After Dr. Bigelow, no experimenter occupied himself with this plant, so far as I am acquainted, until the late Richard Rushton, who, in his inaugural essay* on this subject, before the Philadelphia College of Pharmacy, has extended our knowledge of its chemical constituents. He ascertained the presence of fatty matter, chlorophylle, salts of lime and potassa, iron and lignin; besides giving a more accurate account of its first mentioned constituents.

The following quotation is from the paper of Rushton, under the head of Affinities. "But the congener with which it is most frequently compared, is the European species, Asarum Europœum. Guibourt, in his Hist. Abrégée des Droges Simples, third edition, states 'that the root sent to him, from Philadelphia, by Mr. Durand, did not seem to him

* See Vol. x, Page 181, of this Journal.

to differ from the Asarum Europœum.' From this resemblance, several botanists have been induced to suppose that they were only varieties of the same, which, however, is not the case. If there be, upon fair comparative trial, the *slight difference in medical properties that has been supposed*, may it not be attributed rather to the degree or amount, of the active proximate principle in one, that is not found in the other? Thus the essential oil would seem to be the most energetic element of both, and the greater emetic power of the Asaret of Europe, may depend on its presence in larger proportions."

These remarks lead to conclusions which are certainly erroneous, if we may credit the authors who have written upon the subject. Dr. Wood, U. S. Dispensatory, says, "The root and leaves of Asarabacca, either fresh or carefully dried, are powerfully emetic and cathartic, and were formerly used in Europe with a view to these effects." "But as an emetic they have been entirely superseded by ipecacuanha, and are now used chiefly, if not exclusively, as an errhine. The powdered root snuffed up the nostrils, in the quantity of one or two grains, produces much irritation, &c." Professor Pereira, in his Materia Medica, says "Every part of the plant possesses acrid properties. Applied to the mucous membrane of the nose, it produces violent sneezing, etc." "Swallowed, it causes vomiting, purging, and griping pains."

On the contrary, the Asarum Canadense, except a slight nauseating tendency in large doses, possesses neither emetic or cathartic properties, but is an aromatic stimulant, with diaphoretic powers. It is said formerly to have been used extensively, instead of ginger, by the country people, of some parts of New England, for making ginger beer. I have been informed by those who have used it medicinally, that they have never known it to act as an emetic, or cathartic, and that it is altogether a mild remedy. So striking a difference in the medicinal power of the two plants, renders the supposition of their different chemical character perfectly natural.

The object, therefore, of this paper is to demonstrate the difference which really exists in their chemical constitution.

It will be proper to give an outline of the results of the analysis by Lassainge and Fenoulle, (Journ de Pharm, vi. 565) and Graeger (Annal der Pharm. 1830,) which are as follows:

Graeger.		*Lassainge and Fenoulle.*
The Root.	*The Herb.*	
Volatile oil,	Asarin,	1 A solid volatile oil, (asarin)
Asarum Camphor,	Tannin,	2 A very acrid fixed oil,
Asarite,	Extractive,	3 A yellow matter analogous to Cytisite,* in which the properties of the root reside,
Asarin,	Chlorophylle,	4 Starch,
Tannin,	Albumen,	5 Mucous,
Extractive,	Citric acid, &c.	6 Ulmin,
Resin,		7 Citric acid,
Starch,		8 Bicitrate and malate of lime, &c.
Gluten, &c.		

The yellow matter of Lassainge and Fenoulle, appears to be identical with the Asarin of Graeger. The solid volatile oil of the former, which they call *asarin*, is a mixture of the *Asarum camphor, asarite,* and volatile oil, of the latter.

† When asarum root is distilled (according to Graeger) it furnishes a milky liquid, having an aromatic smell and acrid taste. On the surface of the liquid, yellow drops may be observed swimming, which are gradually converted into needle-shaped crystals, constituting the Asarite. When separated from the liquid by a filter, they were dissolved in alcohol and precipitated from that solution by water. They now constituted a brilliant white mass, floating in the liquid, while a yellow milky fluid was deposited, which was composed of

* Substance Obtained from the Cytissus laburnum, by Chevallier.

†Thompson's organic Chemistry.

volatile oil and asarum camphor; the latter was obtained by evaporating the oil.

Asarite is in small silky needles, sp. grav. 0.95 at 158° Fahr. It melts into an oily liquid, and a further heat volatilizes it in white vapor, which is very irritating.

Asarum camphor, is distinguished from *asarite* by its vapor being much less irritating, and by being precipitated from its alcoholic solution by water, in cubes or six-sided prisms. It melts by heat, and boils at 536°.

Oil of Asarum. This oil has a yellow color, glutinous consistence, is lighter than water, has a sharp burning taste, and a smell of valerian.

By reference to Graeger's analysis, it will be perceived that neither volatile oil, asarite, or asarum camphor exists in the leaves of asarabacca, and as they are less active than the root, it will be proper to attribute the superior activity of the latter to the presence of those ingredients.

The *asarin* of Graeger, appears to be an acrid resinous matter.

Having now given an outline of what is known respecting the chemical constituents of the European asarum, it will be proper to detail a few experiments, which have been principally made, to ascertain what analogy there exists between their volatile ingredients.

Four ounces of the root of the Asarum Canadense, recently dried, was finely bruised, and introduced with eight times its weight of water, into a glass retort, where it was allowed to macerate for twenty four hours. Heat was then applied, and continued until three-eighths of the liquid had distilled. The product consisted of a slightly milky fluid, having numerous large globules of volatile oils floating on its surface. The receiver was allowed to remain with these fluids in it, undisturbed, for forty eight hours, the air having free access; but not the slightest evidence was apparent of any disposition to crystallize, nor was there a trace of crystalline matter in the neck of the retort.

The oil was now separated; it amounted to *five* per cent. of the root employed, and had a straw yellow color.

Again; ten ounces of the dried root, was distilled with seven times its weight of water, and four fluid ounces of alcohol, after maceration for five days. The result of the operation, was a very milky fluid, on which floated a considerable quantity of essential oil, of a lighter color than that before obtained. The milky fluid gradually became transparent, a small quantity of oil separating on its surface, but on the addition of water it again assumed a milky appearance, doubtless owing to the separation of a quantity of volatile oil held in solution through the intervention of the alcohol.

A portion of the distilled fluid and accompanying oil, was exposed in the receiver for two weeks, to the influence of the atmosphere, without the slightest evidence of its becoming crystalline, or in any way changing its character.

Another portion of the distilled water and oil was treated by a current of oxygen gas, and afterwards exposed to an atmosphere of oxygen, but no change whatever ensued, hence it may be concluded that the Asarum Canadense, does not contain either asarite or asarum camphor, nor substances analogous to them.

When an alcoholic tincture of the root is evaporated, a greenish yellow oily matter, and a reddish matter are obtained. The first appears to be a mixture of volatile oil, and an acrid resinous substance, which differs in taste from the oil, in being acrid and bitter, without being aromatic.

When an ethereal tincture of the root is suffered to evaporate spontaneously, there results greenish globules of oily matter floating on the water, which remained after the evaporation of the pure ether. This matter had an acrid disagreeable taste,—and when treated with alcohol nearly all of it was dissolved. On evaporating the alcoholic solution, a semi-fluid substance resulted, which appeared to be a mixture of volatile oil, acrid resin, and probably a little fixed oil. It had a very acrid, burning taste, and when heated, copious

white vapors of volatile oil were evolved, and the resinous matter remained.

In many respects there appears to be an analogy, both medically, and chemically, between this asarum, and ginger and cardamom. They all three possess aromatic, stimulant, and carminative properties; and these properties in all of them, appear to depend on their volatile oil.

The leaves of the Asarum Europœum, according to Graeger's analysis, do not contain any volatile oil, which appears to be the case in regard to the American species; the dried leaves of which, have none of the peculiar aromatic, pungent taste of the root. It is most probable that the emetic and cathartic properties of the former, are mostly due to the acrid matter, called *asarin* by Graeger, and a *yellow matter, etc.*, by Lassainge and Fenoulle. The acrid matter found in the Asarum Canadense, does not appear to possess the activity of that contained in the asarabacca. What part the *asarite,* and *asarum camphor* plry in the medical character of European Asarum is unknown, as no mention is made in any of Graeger's results, which I have been able to meet with.

ART. XXXVI.—PHARMACEUTICAL NOTICES. No. XX.

By William Procter, Jr.

Vallet's Protocarbonate of Lime.

Many have complained of the difficulty attending the successful accomplishment of the process for making this preparation. The extent to which it is now used in this medical community, and perhaps in others, makes a thorough knowledge of the details of manipulation in the process for its manufacture, very desirable. The greatest difficulty which has heretofore attended the process, is the evaporation of the water, from the mixture of hydrated oroto-carbonate of iron and honey. Too high a temperature causes the decomposition of the carbonate, which is only prevented under ordinary circumstances by the presence of the saccharine matter. If, on the contrary, too little heat is used, the evaporation is so slow, as to make the process inconveniently long; not to speak of the protracted exposure of the salt to the action of the atmosphere.

By suspending a thermometer in the mixture during the process, it was found that the evaporation would proceed successfully at the temperature of 150° Fahr.; but much beyond that point, the evolution of carbonic acid gas commenced, and was rapid at the temperature of boiling water; and hence, that by keeping the mixture steadily at 150 degrees, the end desired was attained in the shortest time, compatible with the excellence of the product.

As some time has elapsed since the publication* of the papers on this subject, it is thought that a re-statement of the formula will not be out of place at this time.

Take of Proto-sulphate of Iron, (crystallized,) ℥xvj.
Carbonate of Soda, (crystallized,) ℥xix.
Clarified Honey,
Boiling water, of each a sufficient quantity.

* See Vol. x, pages 244 and 272, of this Journal.

Dissolve the Sulphate of Iron in four pints of the water, and add three ounces of honey to the solution. Dissolve the Carbonate of Soda in the same quantity of water, with a similar quantity of honey, subsequently added. Mix the solutions thoroughly in a bottle just capable of holding the mixture, stop it closely, and allow it to remain 24 hours, until the precipitate subsides. Draw off the supernatant fluid with a syphon, and again fill the vessel with honeyed water, in the same proportion as before, mix thoroughly, and again draw off. Repeat this operation a third time, that all the sulphate of soda may be washed away,—then pour the precipitate upon a flannel cloth, suffer the liquid to drain off as much as possible, and subject what remains to *gradual* pressure, until as much water is removed as possible. Then place it in a suitable evaporating dish, add nine ounces of clarified honey, and mix them intimately. Having put the evaporating vessel on a water bath, the temperature of which should be so regulated as to keep the mixture of honey and proto-carbonate at the temperature of 150 degrees, it should be stirred occasionally at first and frequently toward the last of the evaporation, until it acquires a pilular consistence. There is no difficulty in regulating the temperature of the water bath. By placing a lamp under the vessel which serves as the water bath, its flame may be so regulated as to keep the mixture at the constant temperature of 150 degrees, by placing a thermometer in it, until that degree is attained, and then lowering the flame, if necessary, until the thermometer remains stationary.

This preparation when made in winter, is generally too soft for summer use in the form of pills, without the addition of some dry substance to give it a firmer consistence. My friend Elias Durand, of this city, has proposed the substitution of sugar, for a portion of the honey, which he assures me gives increased consistence to the mass. About 4½ ounces of sugar should be added in place of the same quantity of honey, in the above formula.

By following the above directions, a product will be ob-

tained containing the full equivalent of carbonic acid, and of course proportionably soluble in acids.

Fermentation in Syrups.

The almost inevitable state of fermentation into which many of our syrups enter, during the warmest season of the year, is but too well known, and often puts the pharmaceutist to considerable inconvenience. This more particularly relates to those syrups which contain much vegetable matter in solution, independent of the sugar, which forms the basis of the preparations.

Elias Durand some time ago communicated to me the fact, that Hoffman's anodyne, through the agency of the *oil of wine* which it contains, possessed the remarkable property of completely arresting fermentation in syrups, and preventing it before it has commenced. He finds that syrup of gum arabic, which is very liable to ferment and change, may be kept without difficulty, by the addition of 1.3 per cent. of Hoffman's anodyne, or about 1 part to 75 of syrup. Whatever part the oil of wine may act, in preventing fermentation, the same power is possessed by sulphuric and nitric ethers, and alcohol. A vegetable infusion containing about 10 per cent. of solid matter in solution, was kept for many months, without apparently the slightest change, by the presence of a small quantity of sulphuric ether.

A pectoral syrup, containing an unusually large amount of vegetable matter in solution, such as gum, extractive, etc., which was found to ferment even in moderately warm weather, was wholly prevented from so doing, even during the warmest days of the past summer, by the addition of six per cent. of spirit of nitric ether.

The superior advantage, however, of the Hoffman's anodyne, is due to the smallness of the proportion requisite, and to the slight volatility of the oil of wine, which consequently will continue its influence longer than the ethers.

An additional evidence may be adduced in the case of *brown mixture*, which, when made without spirit of nitric

ether soon spoils, and undergoes the acetous fermentation, while, if that ethereal spirit is added, it keeps for a considerable time.

Coxe's Hive Syrup.

A formula and process for making this preparation, was published in the 11th volume of this Journal, (page 198,) which was believed at the time of its publication to have arrived at complete success, so far as related to obtaining an active remedy, which would keep during warm weather, without undergoing fermentation.

The process alluded to, consists in treating the senega and squill with diluted alcohol, in a displacement apparatus, until twice the quantity of fluid is obtained that is required to make the preparation; then raising the temperature to the boiling point, to coagulate the albumen, then evaporating to one-half, and straining carefully, in order that *all* the coagulated albumen may be removed. Lastly, adding two pounds, avoirdupois, of loaf sugar to each pint of the clear infusion. This process, with some modifications, is the one recommended in the Report of the Committee of Revision on the U. S. Pharmacopœia. Those that have employed this formula, have been much pleased with it for the following reasons:—*Firstly,* The product is decidedly more active than that of the Pharmacopœia of 1830. *Secondly,* It is much less liable to ferment. *Thirdly,* Being made with sugar instead of honey, it is a more handsome preparation.

Coxe's Hive Syrup, made as above, was found to keep very well during the past summer, except on a few of the warmest days, when it evinced a slight disposition toward fermentation, at a temperature of from 80 to 90° Fahr., but not more than simple syrup, kept under the same circumstances. To totally prevent this, it is proposed to add two fluid drachms of Hoffman's anodyne to each pint of the syrup, for summer use; which, without at all injuring its qualities as a remedy, will effectually preserve it from fermentation.

A process, (said to be that originally employed by Dr.

Coxe,) has been lately used by several apothecaries,—which is the following. Proceed in the way above stated, to prepare the infusion or tincture of seneka and squill, then evaporate to the consistence of a syrup, and mix it with as much honey as equals in measure the quantity of the preparation required. Lastly, boil gently, to thoroughly mix them, and add the tartar emetic. When thus made, Coxe's Hive Syrup, it is said, never ferments.

The objections to its being made by this formula, are, that the long evaporation required to reduce five or six pints of fluid down to three or four ounces, will tend to injure the activity of the remedy, even when carefully executed; but careless manipulation will certainly produce this effect; and that honey varies so much in quality and density as would give an irregular consistence to the preparation.

A specimen of syrup made very carefully by this formula, and one made with sugar by the foregoing, without the addition of the Hoffman's anodyne, were kept in similar vessels, equally exposed to the action of the atmosphere for six weeks, and occasionally agitated.

The latter showed evident signs of fermentation at the end of that period, while the former was perfectly unaltered. That, prepared with sugar, however, remained perfectly unchanged, during the same time, by the presence of the quantity of Hoffman's anodyne above indicated.

Syrups.

The employment of the *Saccharometer*, or instrument for measuring the density of syrups, is by no means general. Those who are in the habit of employing this useful instrument in syrup-making, can appreciate the advantages which result from its use, both as regards facility of manipulation and uniformity of consistence in the preparation. The instrument is too well known to need a description, but it may be well to mention, that as a general rule syrups should be concentrated till they mark 30 degrees on the scale, while boil-

ing, which is equivalent to 35 degrees, when cold. In summer the concentration should be carried farther, on account of the liability to fermentation.

It should be remembered, however, that when there is a large quantity of extractive, or other matter, independent of the sugar, an allowance must be made; as; for instance, syrup of senega will mark 37 degrees when cold.

Arrow Root.

The best arrow root received in this country is from Bermuda—from which place it is frequently brought in wooden boxes and casks. The fecula is thus exposed to acquire the odor of the ship, which, together with dampness, gives much of it a musty taste and odor, which renders it unsaleable.

Having had some arrow root thus affected, which otherwise was of superior quality, it occurred that by washing with pure water, and drying it, tbe defect could be removed. On carrying this suggestion into practice, it was found to answer admirably, and the fecula which resulted was equal in every respect to the best article of our market, which may have escaped the influence of the vessel.

All that is necessary to bring about the proposed result is to provide a circular earthen vessel, of three times the capacity of the arrow root to be treated, and fill it two-thirds with pure water. Having given to this fluid a rotatory motion by stirring, gradually add the defective arrow root, constantly stirring until the whole of it is suspended in the water, in which state it should be kept for five or ten minutes. After the fecula has subsided, the supernatant fluid should be decanted, and the operation repeated. Owing to the manner in which the arrow root becomes compacted, in subsiding from water, it is best to remove it from the washing vessel, and afterwards add it to a fresh portion of water as before.

Two such operations will entirely remove the mustiness. All that is necessary in drying it, is to place the damp fecula on frames of muslin, covered with paper, in a warm place,

and in two or three days it is perfectly dry, and possessed of all the characteristics of the pure Bermuda arrow root.

As the grains of fecula are insoluble in cold water, and the mustiness is on their exterior, we can readily conceive how washing it should remove the defect, without injury to the fecula. Since trying this process, a friend, to whom it was communicated, has been equally successful in its application.

Hydrochlorate of Ammonia. Sal Ammoniac.

The difficulty of reducing this salt to powder, in the ordinary way, with pestle and mortar, is too well known to require comment. A much easier and more effectual way is the following, which though not by any means offered as original, may yet be new to many of our pharmaceutists.

Make a saturated solution in boiling water, of the salt, and allow it to cool gradually, stirring constantly, in order, that as the hydrochlorate separates by crystallization, it may be granulated. When cold, throw the whole on a glass funnel, the neck of which is partially closed by a piece of cotton, and allow it to drain, then throw it on bibulous paper and dry i . The salt can now readily be reduced to fine powder.

Black Ink.

Although Ink is not a pharmaceutical preparation, yet it is a compound that the apothecary is constantly called upon to make, either for his own use or for other's, and it has been thought that the following formula would not be out of place here.

Take of Galls, finely bruised,	℥8
Inferior Gum Arabic,	℥4
Sulphate of Iron *in powder*,	℥4
Aqua Fortis,	℥i
Water,	a gallon.

Macerate the galls in a portion of the water, for three hours, then put them into a displacement apparatus, and treat them

with water until exhausted, or until seven pints of infusion is obtained. Dissolve the gum in half a pint of water, and add it to the infusion of galls. Lastly, add the sulphate of iron to the aqua fortis gradually, and afterwards two ounces of water; heat the mixture till red fumes cease to be evolved, then mix the solution with the infusion of galls, agitate the mixture, and the *ink is made.*

ART. XXXVII.—NOTE ON VANILLA.

VANILLA is an article of commerce, more sought for by the confectioner than the apothecary, as it is employed to communicate flavor to sugary preparations, and such as pertain to diet, rather than as an ingredient of medicinal compounds. By the latter, however, it is usually dealt in, and from him the confectioner obtains it. Although not possessed of such decided medicinal properties, as to give to it a prominent place in the list of Materia Medica, where it has of late been located, still it is of sufficient importance to attract attention. The interest attached to it is also greatly enhanced by the favorable estimation in which it is held by the public, a circumstance, which at times has created a demand for a greater supply.* In the following communication we propose to detail the facts connected with its history, as well as notice the application to which it has been put in a medicinal point of view.

Originally by Linnæus, the fruit of the plant which is the product used, was attributed to the Genus Epidendrum ; by Swartz it was separated and called *Vanilla aromatica.* It belongs to the natural family of ORCHIDEÆ, and to the Linnaæn clasification, *Gynandria. Diandria.*

It is a woody, sarmentose plant, elevating itself to some

* We have been informed by Mr. Ritter, our collaborator, that the drug has recently commanded three times the usual price of the market.

height, by seizing on and attaching itself to the trunks of contiguous trees, by means of radical fibres, which insert themselves into the bark. Its leaves are alternate, sessile, thick, fleshy, a little coriacious, smooth, shining, slightly undulated upon the borders. The flowers are large, forming clusters of five or six, purple, odoriferous. The five superior divisions of the calyx, are lanceolate, a little undulated, the lip is oboval, grooved and hollow, a little sinuous on the margin. The *fruit* is from five to eight inches long, and two to four lines in diameter, straight, obscurely triangular, with a suture between the valves, somewhat pointed at the end of attachment, obtuse at the opposite ; color reddish brown or black, shining; wrinkled longitudinally. The surface is somewhat viscid. Internally, the fruit is filled with an innumerable quantity of black seeds, dull, and surrounded by a pulp of the same color, small in quantity and intermingled with medullary matter of a red color. This fruit improperly goes by the name of the *vanilla bean*, an appellation derived from its appearance. Vanilla is stated to come from *vaina*, or sheath, in Spanish, of which the diminutive is *Vainilla*. The Spaniards of Guaiana call it *Banilla*, and the Mexican name is *Tilxochitl.*

The Vanilla plant is a native of South America, and some of the West India Islands. It grows particularly in Peru, Brazil, Guaiana, and is also found in Mexico. In some colonial positions it is cultivated, as at Cayenne, St. Domingo and the Isle of France. Like all the Orchideæ, however, it is difficult to cultivate, and does not afford fruit of much value until seven years of age. The difficulty of cultivation must arise from its peculiar habit which is that of a parasite; although having its root in the ground, it soon becomes independent of this attachment, and when cut from it, will sustain itself by the radicles penetrating the bark of the trees which support it. It, likewise, prefers sombre, shady situations.

Vanilla is collected before it attains perfect maturity,—this is to avoid the separation of the valves and the escape of a thick fluid, which forms in it, and constitutes what is known

and used in Peru as Balsam of Vanilla, an article not known in Europe or this country. The drying operation is accomplished in the shade, and each fruit is touched with oil, to keep it supple and to keep off the insects. When fully prepared, bundles are formed, composed of from five to one hundred pieces. The odor is exceedingly sweet and agreeable in this state; in order to retain its freshness and value, it is preserved in close tin or leaden canisters. Some other modes of preparation are mentioned; thus, the fruit is dipped in boiling water, drained by hanging it up, and dried by exposure to a current of air for 15 days. It is then wrapped in oiled paper, by which its qualities are preserved. The Mexicans are said to prepare Vanilla by a kind of fermentation, which they arrest in time. Perhaps it is to this fermentative action that it owes its flavor, as the fruit when green possesses none of it, but acquires it subsequently.

According to Guibourt, there are three varieties of this drug, which "appear to be attributable to three varieties of the same plant, for to the present, botanists recognise but one species."

The first sort, which is most esteemed, corresponding with what the Spaniards call *Leg* or *Lec*, legitimate; it is from six to eight inches long, three or four lines broad; wrinkled and grooved lengthwise, narrow at the extremities and curved at the lower end; it is a little soft and viscid, of a deep reddish brown color, and possessed of a strong and sweet odor, similar to that of Balsam of Peru.

When kept in a dry place, and in a vessel not closely covered, this article is not long in becoming covered with brilliant needle-shaped crystals, those of Benzoic acid. It is then called *frosted vanilla.*

The second sort, is the *Simarona,* or bastard Vanilla. This has all the physical characters of the preceding, and it is evident that it is from the same species; it, however, is smaller, of a less deep brown color, dryer, less aromatic, and not frosted.*

* Hist. Abregée des Drogues Simples.

The last kind is named by the French *Vanillon*, by the Spaniards it is called *pompona* or *bova*, from its swollen appearance. It is always from five to seven inches long, but from six to nine lines broad. It is very brown, soft, viscid almost always open, and appears to have passed the point of maturity; it is endowed with a strong odor, but less agreeable than the first, and little balsamic; often, also, it has the taste of fermentation; it is bought for a lower price. This kind, must certainly be produced by a different species of the plant.*

The analysis made by Bucholz, showed that Vanilla contains,

1. A fatty oil.
2. Soft Resin.
3. An Extract, a little bitter.
4. Peculiar Extractive.
5. Apothema.
6. Sugar.
7. Amyloid substance.
8. Benzoic Acid.
9. Fibre.

The fatty oil has a rancid taste and a disagreeable odor, the resin is soft and gives off when heated the feeble smell of Vanilla. The peculiar extractive resembles tannin. It precipitates the salts of iron green, renders tartar emetic cloudy, but does not precipitate gelatine. As to the benzoic acid, the crystals regarded as such are not acid.†

Bucholz says that Vanilla does not give off a volatile oil by distillation. This favors the idea of the generation of the odoriferous principle by fermentation.

In the mode of affecting the economy, the substance under

* There are a number of species noticed by authors, as V. *claviculata*, V. *angustifolia*, and V. *planifolia*. Schiede, (*Schlechteudas*,) Linnœa, Oct. 1829, s. 573, mentions three Mexican species, V. *sativa*, V. *sylvestris*, and V. *Pompona*.—See Pereira's Mat. Med. Mr. Salisbury states the V. *planifolia* was discovered in St. Domingo by Father Plumier, and introduced into the hot-houses of England.—Loudon, Encyc. of Plants.

† Soubeiran, Nouveau Traite de Pharmacie.

consideration is stomachic and cordial; it exerts a decided tonic action, facilitating digestion and invigorating nervous influence. In large dose it has the reputation of exerting aphrodisiacal power in a marked degree. Of late, it has been little used, except as an addition to articles of diet, which may be more readily digested, in consequence of its stimulating property. The following modes of employment have been taken from Soubeiran's Treatise.

Powder of Vanilla.

℞	Vanilla,	1 part.
	Sugar,	4 "

Triturate and pass through a hair seive.

To be used for culinary purposes, or medicinal preparations.

Tincture of Vanilla.

℞	Vanilla,	1 part.
	Alcohol at 33°,	8 "

Macerate and filter.

Alcoholate of Vanilla.

℞	Vanilla,	1 part.
	Carbonate of potassa,	¼ "
	Rectified alcohol,	16 "
	Water,	16 "

Macerate the vanilla with the carbonate of potassa in the alcohol, for twenty-four hours, add the water, and remove 15 parts of the liquid by distillation. *(Batav. Phar.)*

Troches of Vanilla.

℞	Vanilla,	1 oz.
	Sugar,	7 "
	Gum Tragacanth,	½ drach.
	Water,	q. s.

Make in the usual way, troches of 8 grs. each, containing one grain of vanilla.

J. C.

ART. XXXVIII.—ON THE ACTION OF SAL AMMONIAC ON IODIDE OF POTASSIUM, AND UPON A PECULIAR MODE OF EXTERNAL USE OF THIS SALT. By M. Vogel de Munich.

M. Breslau, Chief Physician to the King, who uses extensively the mineral water of Heilbrow, in which I found, in 1825, iodide of soda in notable quantity, has employed for some time the iodide of potassium in a peculiar manner as I have had occasion to witness.

M. Breslau, employs a powder composed of iodide of potassium and sal ammoniac, which he causes to be enclosed in fine linen, and applied to the affected part.

As I remarked that the lined bag containing this powder, and applied to the neck of a young person, had acquired, after a few days, a brown color, this phenomenon attracted my attention, and caused a desire to know what change had taken place in the two salts; I therefore undertook a series of experiments, with the view of ascertaining the cause.

When we triturate together eight parts of sal ammoniac and one part of iodide of potassium, equally well dried, (for it is in these proportions that the salts are used by M. B.) ammonia is disengaged, and turmeric paper placed near the mixture becomes brown. This takes place with the iodide of commerce, which is usually feebly alkaline; but if we use iodide of potassium, which has been purified by repeated crystallizations, the disengagement of ammonia is almost wholly avoided.

The mixture of sal ammoniac and iodide of potassium, in the above proportions, is perfectly colorless, and preserves its whiteness for an indefinite time, if kept from contact of air in close vessels.

When we moisten this mixture, either that recently prepared or which has been kept for some time, with a weak solution of starch, it does not become blue, from whence it follows, that in a recent mixture as well as one which has been well preserved, there is no free iodine.

If we expose the mixture to the air, it soon loses its white color ; at the end of 24 hours it commences to become yellow, and this more rapidly in appearance, when spread in thin layers on filtering paper, or still better if placed in contact with organic substances.

The solution of this mixture, which has been exposed to the air, is colored of an orange tint, and assumes with a solution of starch, an indigo blue ; there is, therefore free iodine present.

When a colorless aqueous solution of the fresh mixture is exposed to the air, it becomes yellow and strikes a blue color with a solution of starch ; while a solution of the fresh mixture, kept in well stopped vessels, was preserved for months without change.

If we place the fresh mixture in a porcelain capsule, over mercury, and cover it with a bellglass, filled with carbonic acid gas, no absorption or change takes place.

The fresh mixture was finally placed under a bell glass of air dried by chloride of calcium ; it was preserved for many days without becoming yellow, while the same introduced into a moist air, lost its pulverulent form, and became conglomerated into yellow balls, which became blue with a solution of starch.

I placed the white mixture in a flat porcelain plate, in the cellar, and covered it with a cylinder, which had a number of small openings near the bottom to create a current of air ; upon the open part of the cylinder was placed paper moistened with solution of starch. The paper separated from the surface of the mixture by a space of about three inches, became blue at the end of some days ; which did not take place when the vessel was covered with paper impregnated with fecula, and moist air excluded.

The mixture in the cellar became partially liquid, and afterwards passed to a dry state ; new pieces of paper steeped in a solution of starch, and placed at a certain distance from the mixture, assumed a blue tint for four months; from which it results, that iodine was disengaged for a long time, so that this

mixture enclosed in a linen bag, may be successfully used for a long time in chronic complaints, in which the slow and constant disengagement of iodine is applicable. At the end of six months, there was no traces of iodide of potassium in the mixture, and the residue consisted of sal ammoniac, and chloride of potassium.

Iodide of potassium is decomposed by sal ammoniac at an elevated temperature. When a mixture of these two salts is heated in a retort, by the flame of a spirit lamp, there passed into the receiver, besides sal ammoniac, iodine of the iodide of potassium; the whole of the iodide is not, under these circumstances, decomposed by the sal ammoniac. When the whole of the sal ammoniac is volatilized by a red heat, the residue contains, besides chloride of potassium, a little iodide of potassium.

Action of Ether on the Iodide of Potassium, and on the Iodide of Lead.

Well formed crystals of iodide of potassium very slightly attract moisture from the air, but undergo no other change; also a solution of this salt is not decomposed by contact with the air. On the contrary, when we moisten the crystals, well dried and powdered, with ether, they assume after some time a yellow color, and contain free iodine. I have boiled this salt four or five times in successive portions of ether, and each time iodine was dissolved; the residue thus treated had become slightly alkaline, but still contained much iodine.

This partial decomposition, by means of ether, also takes place with compounds of iodine, which are with difficulty dissolved in water.

When for example we digest the yellow plates of iodide of lead in ether, this liquid becomes of an orange yellow and contains iodine, but no lead. By repeated actions we come to a point at which the ether is no longer colored, and does not dissolve any more iodine. The residue upon which the ether no longer acts, has lost the brilliant gold color which it previously had, and become brownish yellow, with no lustre.

Boiling water now dissolves scarcely a trace of the iodide, and does not become colored. On heating this residue with the contact of air, and treating it with nitric acid, it reacts like pure oxide of lead, but still contains iodine which cannot be separated by the ether.

Aldehyd does exert similar decomposing action upon the crystallized iodide, but under these circumstances much ether is eliminated.

The action of other Chlorides upon the Iodide of Potassium.

No other chloride besides sal ammoniac appears to have the property of decomposing iodide of potassium, at ordinary temperatures, and in contact with the air. Iodide mixed with chloride of potassium, undergoes no change by exposure to the air for eight days; no iodine is set free.

A mixture of iodide of potassium and chloride of sodium, disengages, at the end of some days, a trace of iodine, but it appears to me that this decomposition is not due to the chloride, but to some foreign admixture. As sea-salt coming from all the manufactories of Bavaria, contains traces of sal ammoniac, I sublimed the sal ammoniac by means of a dull red heat, and when cool, mixed the salt with iodide of potassium. This mixture, left exposed on a stand for eight days, did not disengage any iodine, but a similar mixture spread upon paper colored it of a very bright yellow, after some days, and the paper contained traces of iodine. The iodide of potassium is decomposed, however, in a very marked manner at a high temperature, when mixed with chloride of sodium, or even with chloride of barium, and heated by the flame of alcohol in a glass retort.

Sal ammoniac, therefore, appears to be the only chloride which can produce a slow decomposition, at ordinary temperature and in contact with a moist atmosphere.

We may add, likewise, that sal ammoniac always slightly reddens tincture of litmus, and may act up to a certain point, as an acid salt, which would decompose the iodate of potassa, when a small quantity of this salt exists in the iodide. But

the slow disengagement of iodine is effected by the sal ammoniac even when the iodide is totally exempt from the iodate.

The large proportion of the sal ammoniac would appear to favor the disengagement of the iodine, in as much as the iodide is more minutely divided, and offers a large surface for the action of the moist air ; at least I have found that the liberation of iodine was slow in a mixture of two parts of sal ammoniac with one of iodide of potassium ; it is therefore proper to adhere to the above proportions of eight parts of sal ammoniac to one of iodide of potassium.

The advantages for the practitioner to employ this mixture as an external application, consists principally in its convenience, and in the successive disengagement of an active agent, such as iodine. As soon as the iodine is set free it may be absorbed by the affected part, without being exposed to the risk of applying too large an amount upon one point, from which more or less serious inconvenience might result to the patient.

Conclusions.

It results from these experiments,

1. That iodide of potassium mixed with sal ammoniac does not undergo any change by the contact of dry air.

2. That the same mixture is decomposed by moist air, so as to form an iodide of ammonium, from which the iodine is successively liberated.

3. That the oxygen of the air is not absorbed by this mixture, but the change is due to the decomposition of water, slowly absorbed from the atmosphere.

4. That after the lapse of several months, the iodide of potassium is decomposed into iodide of ammonium, which volatilizes, setting iodine free, and into chloride of potassium which remains with the excess of sal ammoniac.

5. That dry iodide of potassium, as well as crystallized iodide of lead, is partially decomposed by ether, which takes away a certain quantity of iodine.

6. That no other chloride besides sal ammoniac can decompose iodide of potassium at ordinary temperatures and in contact with moist air; but may at a high temperature.

7. Finally, that it is advantageous for the practitioner to employ a mixture of iodide of potassium and sal ammoniac, as an external application, when the object is to develope successive portions of iodine in small quantities, and for a long time, as the disengagement of iodine will continue without interruption for several months.

Journ. de Pharm.

ART. XL.—ON THE LIMIT TO THE ACTION OF CERTAIN CHEMICAL REAGENTS.

Mr. P. Hastings, having examined the action of certain chemical reagents, has given the following statement of the results.

I. The sensibility of *starch* as a reagent for *iodine*.

Iodide of potassium slightly acidulated with nitro-muriatic acid, tested by a diluted solution of starch, gave the following results.

1. Containing 1-500dth iodine gave a black precipitate, the upper surface brownish yellow.

2. Containing 1-1000dth iodine gave nearly the same color.

3. Containing 1-2000dth iodine, gave the precipitate the same color, but the solution slightly colored.

4. Containing 1-3000dth iodine, precipitate bluish black, the solution nearly clear.

5 and 6. Containing 1-4000dth to 1-5000dth iodine, precipitate bluish black, the solution quite clear.

7 to 11. Containing 1-10,000dth to 1-40,000dth iodine, very dark blue.

12 and 13. Containing 1-50,000dth to 1-60,000dth iodine blue, with a shade of violet.

14 and 15. Containing 1-80,000dth to 1-100,000dth of iodine, the upper stratum violet blue, the under stratum violet.

16. Containing 1-120,000dth iodine, the upper stratum violet, the under stratum rose color.

17. Containing 1-150,000dth iodine, the whole precipitate rose color, with a shade of violet.

18 and 19. Containing 1-200,000dth to 1-250,000dth iodine, rose color, the upper surface only with a shade of violet.

20 to 22. Containing 1-300,000dth to 1-400,000dth iodine. the whole precipitate of a rose color.

23 to 25. Containing 1-450,000dth to 1-550,000dth iodine, the upper stratum of the precipitate was slightly rose color, the under stratum was white.

The action took place immediately on the addition of the starch, as far as No. 19. The following numbers required some period to elapse first; it required some hours in the solution of 1-500,000dth to 1-550,000dth, before any effect was produced.

II. The sensibility of reagents *on acids.*

For Sulphuric acid.—Specific gravity 1.829. Containing 75.83 per cent. real acid.

Syrup of violets did not detect less than 1-250th sulphuric acid of the above specific gravity, or 1-310th real acid.

Paper stained with Brazil wood, was acted upon by 1-10,000dth or 1-12,500dth real acid.

Paper stained by tincture of red cabbage, was reddened by 1-15,000dth, or 1-18,750th real acid.

Paper stained by logwood, was changed to a golden yellow color, by 1-50,000dth or 1-52,500dth real acid.

Paper stained by litmus was immediately reddened by 1-20,900dth or 1-25,000dth real acid, and after some hours was slightly reddened by 1-50,000dth or 1-62,500dth real acid.

Carbonate of potassa occasioned a slight effervescence with 1-250th, or 1-310th real acid.

For Phosphoric acid.—Brazil wood paper, and paper stained with red cabbage, detected 1-10,000dth of anhydrous phosphoric acid.

Litmus paper was immediately reddened by 1-10,000dth, and after some hours by 1-30,000dth phosphoric acid.

Peculiar reagents for various acids.

For free Sulphuric acid.—A concentrated solution of chloride calcium, occasioned a precipitate, after some hours in a solution containing 1-130th real sulphuric acid.

A solution of acetate of lead, gave a precipitate with 1-50,000 real acid.

A solution of chloride of barium, gave a precipitate with 1-75,000dth.

For combined Sulphuric acid.—Acetate of lead produced a precipitate in a solution of sulphate of soda containing 1-36,000dth of acid.

Chloride of barium in a solution of the same salt, containing 1-45,000dth acid.

For Nitric acid.—By means of hydrochloric acid, and gold leaf, 1-240th of nitric acid, specific gravity 1.32, was detected ; the gold leaf was dissolved in 24 hours.

For Phosphoric acid.—Acetate of lead produced an immediate precipitate with 1-10,000dth anhydrous acid, and with 1-20,000dth, after remaining for half an hour.

Lime water produced exactly the same effect.

Chloride of barium did not occasion a precipitate in less than 1-10,000dth.

For Arsenious acid.—Lime water in excess produced a precipitate in a solution, containing 1-4000dth of this acid.

Ammoniacal solution of oxide of copper, detected 1-8000dth.

Sulphate of copper and ammonia, detected 1-12,000dth.

The two last reagents occasioned precipitate in still more diluted solutions, but the precipitates did not possess their characteristic green color.

Hydrosulphuric acid produced a precipitate in 1-30,000dth.

Ammonia nitrate of silver formed a yellow precipitate with 1-30,000dth ; with a more diluted solution, the color of this precipitate was not sufficiently apparent.

III. The sensibility of reagents *for metals and their oxides.*

For free alkalies in general.—Turmeric paper detected the presence of 1-3000dth caustic alkali.

Paper stained with red cabbage, detected the presence of 1-7500dth of caustic alkali.

Brazil wood was colored slightly violet, with 1-20,000dth.

Litmus paper reddened by acetic acid, was distinctly rendered blue by 1-80,000dth.

Hydrate of potassa contains 16 per cent. of water, therefore the quantity of real potassa detected by the above agents, was 1-3600dth, 1-9000dth, 1-24,000dth and 1-95,000dth.

For Potassa.—An alcoholic solution of chloride of platinum, occasioned a precipitate in a solution of nitrate of potassa, containing 1-206 of this base; a solution containing 1-200dth was not precipitated by it.

A very concentrated solution of tartaric acid, produced a precipitate with 1-220th, but none with 1-230th. The sensibility of the reagents was tried at 59° Fahr.

For Lime.—Oxalate of ammonia produced a cloudiness after a few minutes, in a solution of chloride of lime, containing 1-400,000dth of lime.

For Baryta.—Fluo-silicic acid produced a slight precipitate in solution of chloride of barium, containing 1-3800dth of baryta.

A solution of sulphate of soda produced, in half an hour, a cloudiness in a solution containing 1-71,000dth.

For Magnesia.—A solution of phosphate of soda, indicated in 24 hours, the presence of 1-200,000dth of magnesia, in a solution of sulphate of magnesia. This reagent must be very concentrated, and a quantity equal to the solution examined, must be added. These conditions are absolutely

necessary, as otherwise the reagent will not indicate the presence of even 1-1000dth magnesia in solution. This is probably the reason that M. Roth fixes the delicacy of this reagent at 1-4000dth of magnesia.

A solution of ammonia produced, after some minutes, a slight precipitate in a solution, containing 1-6000dth magnesia.

For Protoxide of Iron.—Tincture of galls, and a solution of ferro-prussiate of potassa, acidulated with a few drops of hydrochloric acid, indicated, after some minutes, the presence of protoxide of iron, in a solution containing 1-440,000dth of crystallized sulphate of iron.

For Peroxide of Iron.—Tincture of galls indicated the presence of 1-300,000dth of peroxide of iron, in solution of sulphate of peroxide of iron, by rendering it of a slight violet color.

A solution of ferro-prussiate of potassa indicated the presence of 1-420,000dth of the same salt.

For Copper.—A solution of ammonia gave, after several hours, a slight blue color to a solution of sulphate of copper, containing 1-9400dth of oxide of copper.

A solution of prussiate of potassa rendered the presence of 1-7800dth of the same salt visible.

Polished iron showed the presence of 1-125,000dth of oxide of copper, or 1-156,000dth of metallic copper, if the solution was acidulated by a drop of nitric acid.

For Lead.—A piece of zinc precipitated lead from a solution of the nitrate, when 1-3000dth of oxide was present.

An excess of sulphuric acid occasioned a precipitate in a solution of the same salt, containing 1-20,000dth of oxide.

A solution of chromate of potassa occasioned a cloudiness in a solution containing 1-70,000dth of the same oxide.

A solution of hydrosulphuric acid, blackened a solution containing 1-350,000dth.

For Silver.—Chromate of potassa produced a slight red precipitate in a solution of nitrate of silver containing 1-10,000dth

of oxide. No re-action took place in a solution containing above 1-20,000dth.

Arsenite of potassa produced a decided yellow precipitate with 1-6000dth oxide in solution, but none with 1-20,000dth.

Iodide of potassium indicated the presence of 1-4000dth oxide, but produced no action with 1-30,000dth.

A solution of hydrosulphuric acid, precipitated a solution containing 1-35,000dth of oxide.

Chloride of sodium produced a cloudiness in a solution, which contained only 1-240,000dth.—*Extracted by E. F. Teshmacher, from the Journal für Practische Chemie, No.* 1, 1841.

Lond. Ed. and Dubin Phil. Mag.

ART. XL.—ON THE MOST IMPORTANT CHEMICAL MANUFACTURES, CARRIED ON IN GLASGOW AND THE NEIGHBORHOOD. By Professor THOMAS THOMSON, of Glasgow, F. R. S.

From the Transactions of the British Association, for the advancement of Science, for 1840.

" GLASGOW being the seat of a great many interesting and important chemical manufactures, it occured to me (said Professor Thomson) that it might be of advantage to those members of the chemical section, who have come from a distance, to give a short catalogue of the most important of these manufactures, that they might know what the information is which they expect, and where they are to look for it."

1. *Iron.* The smelting of iron has been practised in the neighborhood of Glasgow for more than fifty years; when the late Mr. Dunlap, of the Clyde Iron Works, first became proprietor of those works, perhaps the only one then in the vicinity, the product was only fourteen tons a week, or 728 tons a year. At present the quantity of iron smelted in Glasgow and the neighborhood, cannot be much less than 200,000 tons, which approaches to a fifth part of the whole iron smelted in Great Britain. The ore is very abundant all round Glasgow, and especially in the neighborhood of Airdrie, where the principal works are now situated. Fortunately for the smelters, the iron-stone and coal-beds are associated together, the iron-stone either occurring in nodules or beds along with the coal. The rapid increase of iron smelting has been the consequence of a discovery of Mr. Neilson, manager of the gas works. This is now universally known under the name of the hot blast. The air is heated to more than 607° before it enters the furnace, by passing through a range of heated pipes. Under this treatment it is found that the coal may be used without previous coking ; and that instead

of seven tons of coal for every ton of cast iron, three, or even two and a half tons will suffice. There is also a diminution of the quantity of lime stone necessary, and the produce of iron per week from the same furnace, is considerably increassed. It is said that neither in Staffordshire nor in Wales, is the hot blast attended with the same saving of fuel. Till of late years, no bar iron was made in Scotland, the smelters confining themselves to cast iron. About three years ago, Mr. Dixon commenced the manufacture of bar iron near St. Rollox, but, after some time, he abandoned the manufactory. It is now conducted on a grand scale by Mr. Wilson, at Dudyvon, and by Mr. Dixon, at Glasgow, and perhaps by other iron masters. The heat raised in the puddling furnace, is much greater than it was in Staffordshire, when Dr. Thomson witnessed the process, there about twenty-five years ago. There is an interesting manufactory of steel near Holytown, not far from Airdrie, where the smelting and casting of steel may be seen; the heat necessary for this purpose, is greater than for any other. It is curious that the clay in the neighborhood, answers perfectly for making crucibles for cast steel; but it does not answer so well as Stourbridge clay for making glasshouse pots. On analysing the two clays, it was found that the Garnkirk, contained much more alumina, and less silica than the Stourbridge ; showing that glass in fusion acts much more powerfully on alumina than on silica.

2. Another manufactory of importance, and which is indebted to Glasgow for the state of perfection, which it has reached, is *Sulphuric Acid.* It was begun by Dr. Roebuck, at Preston-pans, about the year 1763, but it is not more than twenty years since his manufactory was abandoned.

The Sulphuric acid works at St. Rollox, on the banks of the Monkland canal, were begun about forty-five years ago. They were at first upon a very small scale, though they are now, probably the largest of the kind in Europe. Dr. Roebuck's method was to mix together sulphur and saltpetre, and after setting the mixture on fire, to introduce it into a leaden vessel or chamber, at the bottom of which there was a quantity

of water. This method was not economical. A portion of the sulphur would unite with the potash of the saltpetre, and form with it a sulphuret, and probably a portion of the sulphuric acid formed, would also unite with the potash and form a sulphate. When Messrs. Knox, Tennant, and Macintosh established their works at St. Rollox, they separated the sulphur from the saltpetre; the sulphur was burnt over a stove, and an iron cup, containing the requisite quantity of saltpetre, was placed over the burning sulphur.

By this contrivance the sulphur was completely converted into sulphurous acid, and the whole of the nitric acid crrried along with it into the leaden chambers. The size of the leaden chambers was gradually increased, and the substitution of steam for water formerly placed at the bottom of the chambers was a vast improvement. The acid which collects at the bottom of the chambers has a specific gravity of 1.75, or it is a compound of one atom anhydrous acid, and two atoms water. This acid is concentrated by heating it in a platinum still, till the second atom of water is driven off. When this manufacture is at full work, the quantity of sulphuric acid made in it exceeds 300,000lbs avoirdupois, per week. When he first began to purchase acid, about forty-five years ago, it cost 8*d.* per pound; the present price is under a penny a pound.

3. One of the great purposes to which sulphuric acid is applied at St. Rollox's, is the manufacture of *bleaching powder, or chloride of lime*, as it is now called. When the mode of bleaching by chlorine was introduced into Great Britain, by Mr. Watt, in 1787, the very offensive smell and deleterious effects of the gas upon the workmen, was a formidable obstacle to its use. Various methods were tried to remove this objection. It was found that if potash, or soda was dissolved in the water before it was impregnated with the chlorine gas, the disagreeable smell was destroyed; but unfortunately the addition destroyed, at the same time, the bleaching power of the gas. At last Messrs. Knox, Tennant, and Macintosh discovered that if lime was mixed with the water, before it was mixed with the gas, the disagreeable smell was obviated,

while the bleaching power still remained uninjured. They took out a patent for this discovery; but it was infringed upon by the Lancashire bleachers; a law-suit was the consequence, and the patent was destroyed. It was then that Mr. Macintosh tried whether chlorine would not be absorbed by slacked lime. The trial succeeded; a compound was formed which readily dissolved in water, and the solution of which, possessed great bleaching power; a patent was taken out for the manufacture of this dry powder, which the patentees distinguished by the name of bleaching powder. This patent was not infringed; the sale of it was at first small, and it was overlooked by the bleachers. The consequence was, that the patentees had leisure to perfect their method of preparing it, and to become able to sell it at so low a price that it gradually superseded all the old methods of bleaching by chlorine. The process may be seen at St. Rollox's in great perfection and on a very large scale. The requisite mixture of common salt, binoxide of manganese and sulphuric acid, is put into a leaden still, and the chlorine evolved passes through leaden tubes into air tight stone chambers, the bottoms of which are covered with a stratum of slacked lime, several inches thick. The lime absorbs the gas as it passes into the chamber, and the process is continued, until the absorption is reckoned sufficient.

Bleaching powder, supposing it pure, is a compound of

1. Chloride of calcium,	7
2. Chlorite of lime,	10
3. Water,	3.375
	20.375

Half the lime loses its oxygen, and combines with chlorine, constituting chloride of calcium. The oxygen combines with chlorine, which, in the state of chlorous acid, combines with the other half of the lime, constituting chlorite of lime. Two atoms of water were in the slacked lime. The third atom

must have come along with the chlorine gas, or been absorbed from the atmosphere.

4. After the chlorine has been extricated, there remains in the still a semi-liquid mass, consisting partly of the impurities of the manganese, and partly of sulphate of soda, and sulphate of manganese. If the manganese were pure binoxide, and only the quantity of salt and sulphuric acid necessary for the decomposition were used, the sulphate of manganese, (abstracting the water) would weigh nine and a half, and the sulphate of soda nine. But in order to save the stills by producing the decomposition with little heat, twice as much sulphuric acid is used as is necessary, and this excess is afterwards saturated by means of common salt; so that the quantity of sulphate of soda in the residue is at least twice as great as that of the sulphate of manganese. To get rid of the sulphate of manganese, the residue from the still is fused in a reverboratory furnace at a red heat; this drives off the sulphuric acid and leaves the manganese in the state of sesquioxide.

The whole is dissolved, and the insoluble manganese thrown away. The solution of sulphate of soda is evaporated to dryness, mixed with small coal, and fused again. This destroys the sulphuric acid and converts the soda into sulphuret. This sulphuret being mixed with sawdust, &c., and exposed to an incipient red heat, the sulphur is driven off, and carbonate of soda remains, which is obtained in crystals by solution and crystallization, or in the state of *soda ash*, by a more rapid process. The theory of the last step of the process, in converting sulphate of soda into carbonate, is not very obvious, and would require an experimental investigation to throw light on it.

5. Another chemical manufacture, which may be seen, is *alum making*. There are two establishments, one at Hurlet, about six miles southwest, by the Paisley canal; another at Campsie, about eight miles off, near Kirkintullock, on the great canal, and near the foot of the Campsie hills.

The alum is made from the *shale*, which exists in great

abundance in the exhausted coal beds. This shale is clay, mixed with some coal, and with that variety of iron pyrites which undergoes decomposition, and is converted into sulphate of iron by exposure to the air. The sulphate of iron, thus formed, acts slowly on the clay, and in process of time converts it into sulphate of alumina. When sufficiently concentrated and cooled, the liquor yields an abundant crop of sulphate of iron, which is removed, dried, and sold at a cheap rate. The sulphate of alumina does not crystallize till it is mixed with sulphate of potash, or sulphate of ammonia. Formerly, nothing but chloride of potassium, bought from the soap makers, was used. But of late years (at least at Hurlet,) sulphate of ammonia, from the liquor obtained during the preparation of gas, has been employed. In general the alum made at Hurlet, contains both potash and ammonia; but the manufacturers can supply it free from potash. Such alum is convenient to chemists, because when it is heated to redness, every thing is driven off except pure alumina. At Hurlet and Campsie the mode of concentrating the liquid by a current of heated air passing over its surfaces, deserves attention.

6. At Campsie alum-works, may be seen another interesting chemical manufacture, the fabrication of prussiate of potash, a beautiful well known yellow salt, which crystallizes in truncated octahedrons. It was here that the manufacture of this salt, on a great scale, first began. Before that time it was only prepared in laboratories for scientific purposes, and sold at a high price. Mr. Macintosh introduced it to the calico printers, who used it extensively to produce very beautiful blues and greens. It is prepared by burning the hoofs and horns of cattle in iron pots, along with a quantity of potash. The hoofs and horns of a hundred head of cattle are consumed every day in the works.

For some time no iron was added, the requisite quantity for forming the salt being corroded from the pots during the combustion. But the last time that the author visited the works, he found that iron was mixed with the hoofs, &c., during combustion. The residue after this combustion is lixiviat-

ed with water, and when the solution is sufficiently concentrated, the prussiate of potash crystallizes. Connected with this manufactory of prussiate of potash, is another of Prussian blue. It is made by mixing sulphate of iron, alum and prussiate of potash, and precipitating the whole by an alkali. The precipitate is at first a light blue. But it is washed with new portions of water every day, for several weeks. At every washing the color deepens, and when it has acquired the requisite shade, the prussian blue is allowed to subside, the water is drawn off and the powder allowed to dry. The color varies according to the proportion of alum employed; and it has the finest color of all, with the coppery lustre which is so much admired, when no alumina whatever is mixed in it.

7. Another beautiful chemical product may be seen at Shawfield near Rutherglen, about two miles from Glassgow, in the manufactory of Mr. White. This is *bichromate of potash*, a salt very much used by the calico-printers, and forming the finest and most indelible yellows, oranges, and greens. Its introduction constituted quite a new era in calico-printing. This salt was originally made by heating chromium ore with saltpetre, dissolving out the chromate of potash, and adding the requisite quantity of nitric acid to deprive the chromic acid of half its potash. When this process began the salt was sold at a guinea an ounce; but now when the price is as low as two shillings a pound it is necessary to prepare it by a cheaper method.

It has been found that common potash of commerce may be substituted for saltpetre; and Dr. Thomson believes the manufacturers now contrive to form the bichromate at once, without requiring the use of an acid, which would nearly double the expense. It is stated, that all the bichromate used by the calico-printers is made here and in Liverpool. In the same manufactory may be seen a beautiful product, *tartaric acid*, which is used by the calico-printers to a large amount, chiefly to disengage the chlorous acid from bleaching powder, and enable it to destroy the color on particular parts of the cloth, either that these parts may remain white, or that some

other color may be superadded. Tartaric acid is obtained from cream of tartar, by throwing down the tartaric acid by means of lime, and afterwards decomposing the tartrate of lime by means of sulphuric acid, and crystallizing the tartaric. At the same manufactory may be seen a pretty and simple process, by which the carbonate of soda is converted into sesquicarbonate. By simply exposing it dry, and in powder, in an atmosphere of carbonate acid gas, it absorbs the requisite quantity to be converted into sesquicarbonate.

8. It is hardly proper to mention the manufactory of *acetic acid* from wood, which has been carried on for many years, by Mr. Turnbull, because the first part of the process is carried on at a distance, the distillation of the wood. To free the acetic acid from the tar, which destroys its flavor and taste, the acid is combined with lime, and the acetate of lime exposed to a heat sufficiently high to char the foreign bodies with which it is impregnated, the acetic acid being capable of resisting a higher temperature, without decomposition, than most compound vegetable bodies. The acetate of lime thus purified is decomposed by sulphuric acid, and the acetic acid obtained by distillation. By this process it may be obtained very strong. The author possesses it composed of one atom acetic acid and one atom water. When of this strength it crystallizes in winter, but becomes liquid again in summer. In the same manufactory there is another liquid prepared, namely, *pyroxylic spirit*, now well known.

A most interesting set of experiments on it has been made by Dumas, who has distinguished its basis by the name of *methylene*, and has discovered various new compounds which it is capable of forming.

9. Another chemical manufacture of considerable importance, and which the author believes to be peculiar to Glasgow, is *Iodine*. A few years ago there were no fewer than ten manufactories, in each of which it was made to a considerable extent; but as iodine is only used in medicine, the sale is necessarily limited, and most of these works are now abandoned. The process followed by all the makers was,

Dr. Thomson believes, the process of Mr. Macintosh. Iodine is made from kelp, and it deserves attention, that those kinds of kelp that contain most potash, contain, at the same time, the most iodine. The kelp is lixiviated, and all the salts which can be extracted from the solution by evaporation are separated. The mother water remaining is now mixed with an excess of sulphuric acid. A great quantity of sulphuretted hydrogen is evolved, the bad effects of which on the workmen, are obviated by setting it on fire, and allowing it it to burn as it is extricated from the liquid. To the liquid thus freed from sulphuretted hydrogen, and from muriatic acid, a quantity of binoxide of manganese, equal in weight to the sulphuric acid employed, is added. The whole is put into a leaden still, and heated to a temperature which must not exceed 190° or 200° at most. The iodine passes into the receiver which consists of a series of spherical glasses, having two mouths opposite to each other, and inserted the one into the other.

10. It may seem superfluous to mention *soap*, because it is a manufacture universally known; but soap of a very superior quality is made in Glasgow. The number of soap-works amounts to seven, and one of these, that at St. Rollox, is the third, if not the second, in point of extent in Great Britain. The ingredients of soap, are soda, tallow, and rosin, and sometimes palm oil. Two kinds only of hard soap are made here, namely, *yellow* and *white*.

The yellow soap is made by boiling 9.75cwt. of tallow, 3.25cwt. of rosin, 4cwt. of soda ash, equivalent to 2cwt. of soda, mixed with the requisite quantity of water; the white by boiling 13cwt. of tallow, 4cwt. of soda ash in the same manner. Tallow, which is a compound of two oily acids and glycyffrine, undergoes decomposition, and the soda combines with the acid and forms soap. When the combination is complete, a quantity of common salt is put into the hot liquor. It dissolves in the water and the soap separates, and swims on the top. It is now allowed to cool to 150° at an average, and then taken out in a liquid state, and poured into frames, where it is allowed

to become solid, and then cut into the usual parallelopipeds, or wedges, as they are called. It is customary, during the *cleansing* of the soap, as the pouring it into the frame is called, to mix it with a quantity of caustic soda ley. The soap made in Glasgow is usually a compound of

1 atom oily acid,	53	or per cent.	74.6
2 atoms soda,	8	"	11.2
9 atoms water,	10.125	"	14.2

White soap is cleansed at the average temperature of 181°. Its constitution is precisely the same as that of yellow soap.

11. Bleaching of cotton cloth is carried on here to a great extent. It consists of four processes:—1st. The goods are boiled with lime, at a temperature above the boiling point of water. 2d. The cloth is steeped in a solution of bleaching powder. 3d. It is boiled with caustic soda or potash. 4th. It it is steeped in water acidulated with sulphuric acid.

12. Turkey-red dying has been practised here for almost half a century.

13. *Calico-printing* is carried on here to a great extent; *glass-making* is carried on here, or on the Clyde, in all its branches; for *starch-making* there is only one manufactory. The manufacture of the dye-stuffs called *cudbear*, employed in dying red, has long been carried on here; so has the distillation of spirits and the manufacture of ether.

ART. XLI.—ON POLLEN AND VEGETABLE IMPREGNATION.

[A MEMOIR on this subject was read before the British Association, for the advancement of science, by DR. ALDRIDGE of Dublin, detailing the results of observations he had made respecting it, which appear to us novel and interesting. The following is the substance of the memoir—A. S.]

Dr. Aldridge having discovered that nitric and other inorganic acids, produced the dehiscence of the pollen-grains, in the same manner as if they were placed on the natural stigmatic surface, instituted a number of experiments upon this subject. His results are:

1. The spores of cryptogamic vegetables, which some botanists consider analogous to pollen, do not dehisce under the influence of acids.

2. The pollen of the grapes is spherical, both when dry and placed in water ; with acids it bursts, protruding in one long cylindrical mass, which remains afterward unacted upon by the liquid.

3. The pollen of the Adroideæ, Colchicaceæ, Smilaceæ, Liliaceæ, Commelinaceæ, Butomaceæ, Amaryllidaceæ, Iridaceæ and Cannæ, are, when dry, oval, and marked with a dry neutral line, but become, when placed in water, more broadly oval or circular, the long diameter remaining the same, and the opake line disappearing ; after the addition of an acid the external membrane of the pollen, or peripollen, dehisces by a chink or suture, sufficiently broad to permit the contents or endopollen to escape without any change of form, after which the endopollen remains unacted upon by the liquid.

4. In the Salicineæ, Salicariæ, Leguminoseæ, Rosaceæ, Crassulaceæ, Saxifragiæ, Hypericaceæ, Rutaceæ, Hypocastaniæ, Resedaceæ, and the tribe Helleboreæ, of the Ranunculaceæ, the pollen when dry, oval, and marked with a dark central line, becomes, when placed in water, round, or nearly so—the

dark line disappearing; and when acted upon by acids, assumes a triangular form, and protrudes at three equidistant points cylindrical or club-shaped masses, very similar at their origin to tubes, and presenting the appearance of being enveloped by a membrane.

5. In the greater number of the remaining dicotyledons examined, the dry pollen is opake, and either broadly oval or spherical.

6. In the Ericaceæ, and Epocridaceæ, the pollen grains, when dry, appear triangular or oval in some instances, triangular or rhombic in others, according to the position in which they are examined. Having ascertained the results of acid on the pollen, the author was induced to examine the stigma, and in every case found that the stigmatic tissue gave indications of an acid reaction upon litmus paper. The next question to be examined was, in what manner the fertilizing influence of the male organs is communicated to the ovule? After quoting the opinions of Amici, Brown, Tritzche, Corda, Treviranus, Brongniart and others, the author came to the conclusion that the *bogan* or intestine-like protrusion from the pollen grains is the result of the action of acids upon the fluid which contains the fovilla in the pollen grain; and he infers this from the fact of this tube or *bogan* never being formed when the pollen grain is placed in water, but being constant when the grain is placed in acid. After describing and explaining the anomalous character of the pollen grains in the Orchidaceæ, Fumaraceæ, &c., the author presents the following conclusions as the result of his researches: 1. The stigma is invariably acid. 2. It is in consequence of this acidity, that the pollen bursts. 3. That by the same means the fluid contents of the pollen become coagulated, enveloping the fovilla, and assuming, according to the method of dehiscence, different, and very remarkable forms.

ART. XLII.—VIEWS OF PROFESSOR LIEBIG ON POISONS, CONTAGIONS, AND MIASMS.

[THE following interesting remarks on the *modus operandi* of poisons, &c., prepared for the "British Association for the advancement of Science," byDr. Playfair, at the request of Professor Liebig, contain the new views of the latter on this subject.—A. S.]

Poisons may be divided into two classes, belonging to the inorganic and organic kingdom. Many substances are called inorganic poisons, which have in reality no claim to be considered as such. Sulphuric, nitric, and muriatic acids, when brought in contact with the animal œconomy, merely destroy the continuity of the organs, and may be compared in their modus operandi to the action of a heated iron, or a sharp knife. But there are others—and these are the true inorganic poisons—which enter into combination with the substance of the organ without affecting any visible lesion of them.

Thus it is shown, that when arsenious acid or corrosive sublimate is added to a solution of muscular fibre, cellular tissue, or fibrin, these enter into combination with them, and become insoluble; when they are introduced into the animal organism the same circumstance must happen. But the bodies formed by the union of such poisons with animal substances, are incapable of putrefaction; they are incapable, therefore, of effecting and suffering changes; in other words organic life is destroyed. The high atomic weight of animal substances explains the cause of such small quantities being requisite for producing deadly effects.

To unite with 100 grains of fibrin, as it exists in the human body, (in which it is combined, with 30,000 parts of water,) only 3½ grains of arsenious acid are necessary, or five grains of corrosive sublimate.

The second class of poisons are those belonging to the organic kingdom. For some such substances as brucia and strychnia, no data exists by which it can be determined to what cause their action may be assigned. But the morbid poisons, such as putrid animal, and contagious matter, appear to owe their action to a peculiar agent, which exerts a much more general and powerful action than chemists are aware of. Thus when oxide of silver is thrown into peroxide of hydrogen, the oxide is reduced and metallic silver remains. Here there can be no affinity, for oxygen can have no affinity for oxygen.

It is merely that a body in a state of motion or decomposition is capable of inducting or imparting its own state of motion or decomposition to any body with which it may be in contact. There is a disease frequently produced in Germany, by using decayed sausages as an article of food. The symptoms attending the disease are remarkable, and distinctly indicate its cause. The patient afflicted with the disease becomes much emaciated, dries to a complete mummy, and finally dies. The muscular fibre, and all parts similarly composed, disappear. The cause of the disease evidently is, that the state of decomposition, in which the component parts of the sausages are, is communicated to the constituents of the blood, and this state not being subdued by the vital principle, the disease proceeds, until death ensues. It is remarkable that the bodies of the individuals who have died in consequence of it, are not subject to putrefaction.

The cause of the action of contagious matter is similar. It is merely a gaseous matter in the state of transformation, and capable of imparting the state of transposition, in which its atoms are, to the elements of the blood. It is capable of being reproduced in the blood, just as yeast causes its own reproduction in fermenting *wort*. The causes of the action of yeast and of contagion are considered, by Professor Liebig, to be the same, and he has produced examples, in which similar reproductions take place, in

common chemical processes. There are two kinds of yeast used in brewing Bavarian beer. The fermentation caused by one is tumultuous, that produced by the other is tranquil. They, therefore, induct the peculiar state of transposition in which their atoms are upon the elements of the sugar. The same is the case with the vaccine virus of the cow and small-pox; the one of which produces a violent action upon the constituents of the blood, whilst the other causes a gentle action, quite distinct from the former.

ART. XLIII.—ON THE CONSTITUTION AND PRODUCT OF THE DISTILLATION OF FAT BODIES. By Professor Redtenbacher and Dr. Varrentrapp.

The object of this paper was to show that the composition of the fat acids has hitherto been erroneously stated. A variety of acids were subjected to examination, such as stearic, margaric, oleic, and sebacic acid. Margaric and stearic acids, were shown to possess the same radical; the former being the higher, the latter the lower oxide of it. This radical has the formula of $C^{34}H^{33}$, and may be represented by the symbol $\overline{Ma}$; Thus stearic acid is $2\overline{Ma}+5O$; whilst margaric acid is $1\overline{Ma}+3O$. They thus resemble sulphuric and hyposulphuric acids. Margaric acid is one of the products of the distillation of stearic acid; the oxidation of the latter also causes the formation of the former. Oleic acid was analysed by these gentlemen, having been obtained in a pure state. The results are principally numerical, and are stated in Liebig's Journal for 1840.

Trans. of British Association, for 1840.

ART. XLIV.—ON A NEW FAT ACID.

By Dr. Playfair.

Dr. Playfair had examined some of the vegetable fats for the purpose of ascertaining whether the margaric acid contained in them possessed a constant composition. He remarked that the acid in the butter of nutmegs, was peculiar, and had not formerly been examined. Pelouze and Bondet have stated, in the *Annàles de Chemie,* that it is margaric acid.

Dr. Playfair considered that the radicals of serecic and œnanthic acids were similar; in the former, however, one equivalent of hydrogen is replaced by one equivalent of oxygen. It is a beautiful white crystalline compound, melting at 49° cent., and is soluble both in alcohol and ether. The combination of the acid with oxide of glyceril, exists in the butter; it unites with metallic oxides and forms salts. The formula of the acid is $C^{28}H^{54}O^{3}$.

Ibid.

ART. XLV.—A NEW MODE OF ESTIMATING NITROGEN IN ORGANIC ANALYSIS. By PROFESSOR BUNSEN, of Marlburg.

THE qualitative methods at present employed for the analysis of azotized bodies are admitted to be defective; for it is impossible to employ these processes when the nitrogen and the carbon are in small proportions to each other. Professor Bunsen's process consists in introducing the substance to be analyzed after having mixed it with oxide of copper, into a glass tube. A few slips of metallic copper are then added, and the tube is fixed to Dobereiner's apparatus for producing hydrogen. This gas is conducted through it until all the atmospheric air is expelled, the tube having a rotary motion given to it at the same time, in order to dislodge any air which might be retained between the particles of the oxide of copper. The tube is now hermetically sealed, and introduced into an iron vessel filled with gypsum. The gypsum must be still moist when the tube is introduced, in order that it may be firmly wedged. Thus prepared, it is introduced into the common oven, used for organic analysis, and surrounded with red hot coals. If the tube be of strong green glass it never bursts. When the combustion is completed, the tube is placed below a graduated glass receiver standing over mercury, and the point cut off. The gas which had a pressure of several atmospheres, now rushes into the jar. The carbonic acid is absorbed by a ball of hydrated potash, which is introduced into it, and the remaining gas must be nitrogen, for all the hydrogen must have been converted into water by the oxygen of the oxide of copper. The results obtained by this method agree with theory to the second and often to the third decimal place.

Ibid.

ART. XLVI.—ON BLEACHING VEGETABLE WAX.

By Mr. E. Solly.

Mr. S. has made a series of experiments on the best method of bleaching vegetable wax, the green color of which is very difficult of destruction, and of course a considerable objection to its use in the manufacture of candles. On trying most of the methods usually described as being fitted for the purpose, he found them all more or less objectionable, or inapplicable on a large scale. Some were tedious, requiring a long time for their completion, others expensive, whilst others, again, were inconvenient, from the difficulty with which the materials employed in bleaching were separated from the bleached wax. The author found the best effects were produced by chlorine ; but in this case it was necessary that the materials used to evolve the gas should be intimately mixed with the wax, and then of course the difficulty of separating the residue occurred, and when a stream of chlorine was slowly passed over the wax, the process was very slow and tedious. He subsequently found that strong nitric acid was a very powerful decolorising agent, and it possessed the advantage of leaving no residue which was at all difficult of separation ; the expense of this process was, however, a great objection to its use. The following method was ultimately employed.

The wax was melted, a small quantity of sulphuric acid was poured in, composed of one part oil of vitriol to two of water, and then a few crystals of nitrate of soda were stirred in; the whole was agitated with a wooden stirrer, and kept heated. Nitric acid was thus evolved in considerable quantity and purity from a large surface, and in such a manner that all the acid evolved must necessarily pass through the melted wax. This method answered the purpose very completely ; the process was cheap and rapid, and the residuum being merely a

little solution of sulphate of soda was very easily removed. When it is desired to employ chlorine in place of nitric acid as the bleaching agent, the same process may be adopted.

Ibid.

ART. XLVII.—COMPOUND OF IODIDE OF SODIUM AND IODATE OF SODA.

PROF. FRED. PENNY, in the Transactions of the British Association, for 1840, describes a compound of iodine and soda, which appears to be the sesqui-sodii-iodide of iodate of soda. When examining the action of iodine on carbonate of soda, he obtained a salt which crystallized in regular six-sided prisms, which was white, inodorous, of a sharp saline taste, neutral to test paper, readily soluble in hot and cold water, but decomposed by alcohol into iodate of soda and iodide of sodium. Its solution gives a lemon-yellow precipitate with acetate of lead, yellowish white with nitrate of silver, and fine bright yellow with pernitrate of mercury. It is not affected by solution of starch, but instantly decomposed with precipitation of iodine by the stronger acids. It may also be obtained by the action of iodine on caustic soda. When the solution was evaporated spontaneously, Professor Penny found that long prismatic crystals of iodate of soda were deposited ; but as the evaporation continued, these crystals were re-dissolved, and replaced by those of the double salt. The prior deposition of the iodate of soda, generally occurs in the preparation of this salt, and it appears necessary that there should be an excess of iodide of sodium present in the solution, and that the solution should be strong, in order that the salt should form. When this salt is dissolved in water, and the solution evaporated spontaneously, crystals of iodate of soda deposit, but very few of the double salt will form

The salt may also be procured, by pouring a saturated solution of iodide of sodium, on crystals of iodate of soda, and setting them aside for some days. The crystals will be dissolved and replaced by crystals of the new salt. The following formula is deduced from the results of Professor Penny's analysis: $Na^5I^6O^{12}+38HO$; or regarding it as a compound of iodate and iodide, it may be thus represented $3NaI+2\dot{Na}\ \ddot{\dot{I}}+38HO$.

ART. XLVIII.—ON THE ACTION OF NITRIC ACID ON THE CHLORATES, IODATES, AND BROMATES OF POTASSA AND SODA. By Professor Frederick Penny.

In order to examine the action of nitric acid upon chlorate of potassa, a known weight of the salt was mixed in a retort with a measured quantity of the acid, and the mixture heated on a sand bath; as soon as it became warm, chlorine and oxygen were evolved in a state of mixture, and not of combination, and the chlorate slowly disappeared. The solution was then evaporated to dryness, and the saline residue was found to be a mixture of hyperchlorate and nitrate of potassa, in the proportion of three equivalents of the latter to one of the former. Professor Penny expresses the reaction that occurs, as follows:

$$4\,(K+Cl+O^6) \text{ and } 3(N+O^5)=(K+Cl+O^8) \text{ and } 3(K+N+O^6) \text{ and } Cl^3+O^{13}.$$

The action of nitric acid on chlorate of potassa differs, then, from the action of sulphuric acid on the same salt. With nitric acid the salt is decomposed tranquilly, and the chlorine and oxygen are liberated uncombined; whereas, with sulphuric acid these gasses are evolved in a state of combination, forming that dangerous explosive compound, chlorous

acid. The action of nitric acid upon chlorate of soda, is the same as upon chlorate of potassa. The chlorine and oxygen are set free in a state of mixture, and every four atoms of chlorate of soda, yield three of nitrate, and one of hyperchlorate. The hyperchlorate of soda is a very soluble salt, and crystallizes in small rhombs. It is readily decomposed by heat, but is unacted upon by hydrochloric acid. It deliquesces by exposure to the air.

The action of nitric acid on an iodate is very different from that on a chlorate, and is illustrated in the case of iodate of potassa. When iodate of potassa is boiled for some time with a large excess of nitric acid, it is decomposed into potassa and iodic acid ; the potassa combines with the nitric acid, and the iodic acid is deposited from the solution in minute, hard, and transparent crystals. If the acid solution of nitre, containing the iodic acid, be then evaporated, a reaction takes place; the iodic acid decomposes half the nitre, liberating the nitric acid, and combines with the potassa, forming biniodate of potassa. This change is completed when the mixture is dry, and if the heat be then withdrawn, a definite mixture of biniodate and nitrate is obtained. If the heat be continued, a still further change occurs; the iodic acid expels the whole of the nitric acid, and neutral iodate remains. By acting on iodate of soda with nitric acid, Professor Penny has obtained a biniodate of soda, and by adding a considerable excess of iodic acid to a solution of iodate of soda, he has found a teriodate of soda.

Both these salts are anhydrous. The biniodate of potassa contains one atom of water. He also finds that crystals of iodate of soda contain different quantities of water according to the strength of the solution from which they were deposited. He obtained it with 2, 4, 6, and 8 atoms of water.

The action of nitric acid upon bromate of potassa was next examined, and found to differ remarkably from its action on the chlorate and iodate. Neither hyperbromate nor bibromate is produced, but merely nitrate of potassa.

The nitric acid sets free the whole of the bromic, and this at the moment of liberation is resolved into bromine and oxygen.

In conclusion, the author remarks that the action of nitric acid upon these salts, affords a ready method of distinguishing them from one another.

Trans. of British Association, for 1840.

ART. XLIX.—ON THE SOLVENT POWER EXERCISED BY WATER, AT HIGH TEMPERATURES, ON SILICEOUS MINERALS. By JULIUS JEFFREYS.

"THE few remarks I have to offer, have reference to a paper read before the Royal Society of London, last spring. It briefly related an experiment made to determine the action of water, in the form of its vapor, upon siliceous minerals, at a very intense heat. The experiment was upon a large scale, and consequently very costly, and the results were curious. as establishing a very powerful action, by water, on siliceous minerals, when the temperature is sufficiently high."

Mr. Jeffrey's exhibited a large drawing to the British Association, showing the construction of a large boiler, erected near Furrukabad, a large city 800 miles west of Calcutta. It was the only one of the kind in India, and was employed for vitrifying brown stone, the manufacture of which Mr. Jeffreys had succeeded in introducing into the country. It was heated by four exterior furnaces, each six feet long and five wide. The kiln inside was fifteen feet in diameter and twenty-four feet high. The fuel was wood, and the utmost effect any alkali, which might be supposed to rise in its vapor, ordinarily produced, was a slight glazing of some of the brick surfaces in the kiln, near the entrance of the flame; an appearance which is also seen with other fuel, and with which

all manufacturers are familiar. "For the sake of experiment, I pulled down the four furnaces and rebuilt them, after having made between each and the kiln a deep pit as wide as each furnace, and only nine inches from front to back. About three feet of water was put into each pit, and was renewable from without. Some felspathic and siliceous minerals were placed in the way of the current, just inside of the kiln, and upon some of the arches a few articles of ware were placed, that any action upon them might be observed. Below a full red heat, little effect was perceived, but at a heat above that of fused cast iron, a rapid solution of mineral matter took place. The heat was continued ten hours. When the kiln was opened, more than a hundred weight of mineral matter, though in a very dense and refractory form, had been dissolved, and carried away in the vapor. The wall was eaten away, and presented a rough and quite unglazed surface, like loaf sugar partially melted by water, or as if eroded by some animal; and nothing of the smooth glazed surface, which invariably attends the action of alkali on a siliceous surface. Some articles of ware, in the hottest situation, were partially eaten through; but upon the uppermost arch, where the heat was only a full red, a curious phenomenon appeared. The articles there had received exterior to their own brown glass, and loosely encrusting it, a complete frosted coat of silica, having the appearance of a candied surface. It was manifestly a precipitation from the mineral vapor, and in fact a hoar frost of silica. There was probably from half an ounce to an ounce on each vessel, and several pounds, altogether, were thus precipitated; but by far the greatest portion of the mineral vaporised was, as might be supposed, carried away in the current. Hence, this powerful action was apparently entirely due to the presence of water, there being at all times the same quantity of alkali present in the fuel, whatever that might have amounted to, producing no such effect; the experiment seems to establish, at very high temperatures, a powerful action of water on siliceous matter. To attribute the action to alkali, would not lessen the difficulty,

both because under perfectly similar circumstances, when there was no water, no effect was produced, and because each pound of alkali would have had to dissolve, perhaps, forty pounds of silica. Mr. Jeffreys was informed by a military engineer of distinguished ability, to whom he related the experiment, that he had once observed a similar distinctive effect upon the brick casing of a kiln, by moisture getting in at an intense heat, though no scientific notice was taken of it at the time; and as coal was the fuel in this case, there was still less ground for supposing the action to be alkaline.

Lastly, if alkali did play an appreciable part, the experiment would remain still sufficiently curious, as it showed an abundant vaporization of silica, by a fraction of its weight of alkali, without the influence of fluorine, a phenomenon which has, so far as the author is aware, been only obscurely manifested in minute quantities, as noticed by the late Dr. Macculloch.

Ibid.

ART. L.—SOURCE AND ASSIMILATION OF THE NITROGEN OF PLANTS.

Extracted from Liebig's Organic Chemistry of Agriculture and Physiology.

"We cannot suppose that a plant would attain maturity, even in the richest vegetable mould, without the presence of matter containing nitrogen; since we know that nitrogen exists in every part of the vegetable structure. The first and most important question to be solved, therefore, is: How and in what form does nature furnish nitrogen to vegetable albumen, and gluten, to fruits and seed?

This question is susceptible, of a very simple solution. Plants, as we know, grow perfectly well in pure charcoal, if supplied at the same time with rain-water. Rain-water can contain nitrogen only in two forms, either as dissolved atmospheric air, or as ammonia. Now, the nitrogen of the air cannot be made to enter into combination with any element except oxygen, even by employment of the most powerful chemical means. We have not the slightest reason for believing that the nitrogen of the atmosphere takes part in the processes of assimilation of plants and animals; on the contrary, we know that many plants emit the nitrogen, which is absorbed by their roots, either in the gaseous form, or in solution in water. But there are, on the other hand, numerous facts, showing, that the formation in plants of substances containing nitrogen, such as gluten, takes place in proportion to the quantity of this element which is conveyed to their roots, in the state of ammonia, derived from the putrefaction of animal matter.

Ammonia, too, is capable of undergoing such a multitude of transformations, when in contact with other bodies, that in this respect it is not inferior to water, which possesses the

same property in an eminent degree. It possesses properties which we do not find in any other compound of nitrogen; when pure, it is extremely soluble in water; it forms soluble compounds with all the acids; and when in contact with certain other substances, it completely resigns its character as an alkali; and is capable of assuming the most various and opposite forms. Formate of ammonia changes, under the influence of a high temperature, into hydrocyanic acid and water, without the separation of any of its elements. Ammonia forms urea with cyanic acid, and a series of crystalline compounds, with the volatile oils of mustard and bitter almonds. It changes into splendid blue or red coloring matters when in contact with the bitter constituent of the bark of the apple-tree (*phloridzin*,) with the sweet principle of the *Variolaria dealbata (orcin,)* or with the tasteless matter of the *Rocella tinctoria (erythrin.)* All blue coloring matters which are rendered red by acids, and all red coloring substances which are rendered blue by alkalies, contain nitrogen, but not in the form of a base.

These facts are not sufficient to establish the opinion that it is ammonia which affords all vegetables, without exception, the nitrogen which enters into the composition of their constituent substances. Considerations of another kind, however, give to this opinion a degree of certainty, which completely excludes all other views of the matter.

Let us picture to ourselves the condition of a well cultured farm, so large as to be independent of assistance from other quarters. On this extent of land, there is a certain quantity of nitrogen contained both in the corn and fruit which it produces, and in the men and animals which feed upon them, and also in their excrements. We shall suppose this quantity to be known. The land is cultivated without the importation of any foreign substance containing nitrogen. Now, the products of this farm must be exchanged every year for money, and other necessaries of life, for bodies, therefore, which contain no nitrogen. A certain proportion of nitrogen is exported with corn and cattle; and this exportation takes

place every year, without the smallest compensation; yet, after a given number of years, the quantity of nitrogen will be found to have increased. Whence, we may ask, comes this increase of nitrogen? The nitrogen in the excrement cannot reproduce itself, and the earth cannot yield it. Plants, and consequently animals, must, therefore, derive their nitrogen from the atmosphere.

The last products of the decay and putrefaction of animal bodies, present themselves in two different forms. They are in the form of a combination of hydrogen and nitrogen,—*ammonia*, in the temperate and cold climates, and in that of a compound, containing oxygen, *nitric acid*, in the tropics and hot climates. The formation of the latter is preceded by the production of the first. Ammonia is the last product of the putrefaction of animal bodies; nitric acid is the product of the transformation of ammonia. A generation of a thousand million men is renewed every thirty years: thousands of millions of animals cease to live, and are reproduced in a much shorter period. Where is the nitrogen which they contained during life? There is no question which can be answered with more positive certainty.

All animal bodies, during their decay, yield the nitrogen which they contain to the atmosphere, in the form of ammonia. Even in the bodies buried sixty feet under ground in the church-yard of the Eglise des Innocens, at Paris, all the nitrogen contained in the adipocire was in the state of ammonia. Ammonia is the simplest of all the compounds of nitrogen; and hydrogen is the element for which nitrogen possesses the most powerful affinity.

The nitrogen of putrefied animals is contained in the atmosphere as ammonia, in the form of a gas which is capable of entering into combination with carbonic acid, and of forming a volatile salt. Ammonia in its gaseous form, as well as all its volatile compounds, are of extreme solubility in water. Ammonia, therefore, cannot remain long in the atmosphere, as every shower of rain must condense it, and convey it to the surface of the earth. Hence, also, rain-water must, at all

times contain ammonia, though not always in equal quantity. It must be greater in summer than in spring or in winter, because the intervals of time between the showers are in summer greater; and when several wet days occur, the rain of the first must contain more of it than that of the second. The rain of a thunder-storm, after a long protracted drought, ought for this reason to contain the greatest quantity, which is conveyed to the earth at one time.

But all the analyses of atmospheric air, hitherto made, have failed to demonstrate the presence of ammonia, although, according to our view, it can never be absent. Is it possible that it could have have escaped our most delicate and most exact apparatus? The quantity of nitrogen [of the the ammonia] contained in a cubic foot of air is certainly extremely small, but notwithstanding this, the sum of the quantities of nitrogen from thousands and millions of dead animals, is more than sufficient to supply all those living atone time with this element.

From the tension of aqueous vapor at 15° C.(59° F.)=6.98 lines (Paris measure,) and from its known specific gravity at 0° C. (32° F.) it follows, that when the temperature of the air is 59 F., and the height of the barometer 28," 1 cubic metre, or 64 Hessian cubic feet of aqueous vapor, are contained in 487 cubic metres, or 31,158 cubic feet or air; 64 feet of aqueous vapor weigh about 1½lb. Consequently, if we suppose that the air, saturated with moisture at 59° F., allows all the water which it contains in the gaseous form to fall as rain; then 1 Hessian pound* of rain-water must be obtained from every 20,800 cubic feet of air.

The whole quantity of ammonia contained in the same number of cubic feet will also be returned to the earth in this one pound of rain-water. But if the 20,800 cubic feet of air contain a single grain of ammonia, then ten cubic inches, the quantity usually employed in an analysis, must contain only 0.000000048 of a grain. This extremely small pro-

*1.1lbs. avoirdupois.

portion is absolutely inappreciable by the most delicate and best eudiometer; it might be classed among the errors of observation, even were its quantity ten thousand times greater. But the detection of ammonia must be much more easy, when a pound of rain-water is examined, for this contains all the gas that was diffused through 20,800 cubic feet of air.

If a pound of rain-water contains only $\frac{1}{4}$th of a grain of ammonia, then a field of 40,000 square feet, must receive annually upwards of 80lbs. of ammonia, or 65lbs. of nitrogen; for, by the observations of *Schubler*, which were formerly alluded to, about 700,000lbs. of rain fall over this surface in four months, and consequently the annual fall must be 2,500,000lbs. This is much more nitrogen than is contained in the form of vegetable albumen and gluten, in 2,650lbs. of wood, 2,800lbs. of hay, or 200 cwt. of beet-root, which are the yearly products of such a field, but it is less than the straw, roots, and grain of corn, which might grow on the same surface, would contain.

Experiments made in this laboratory (Giessen) with the greatest care and exactness, have placed the presence of ammonia in rain-water beyond all doubt. It has hitherto escaped observation, because no person thought of searching for it. All the rain-water employed in this inquiry was collected 600 paces southwest of Giessen, whilst the wind was blowing in the direction of the town. When several hundred pounds of it were distilled in a copper still, and the first two or three pounds evaporated with the addition of a little muriatic acid, a very distinct crystallization of sal-ammoniac was obtained: the crystals had always a brown or yellow color.

Ammonia may likewise be always detected in snow-water. Crystals of sal-ammoniac were obtained by evaporating in a vessel with muriatic acid several pounds of snow, which were gathered from the surface of the ground in March, when the snow had a depth of ten inches. Ammonia was set free from these crystals by the addition of hydrate of lime. The inferior layers of snow, which rested upon the ground, con-

tained a quantity decidedly greater than those which formed the surface.

It is worthy of observation, that the ammonia contained in rain and snow water, possessed an offensive smell of perspiration, and animal excrement,—a fact which leaves no doubt respecting its origin.

Hünefeld has proved, that all the springs in *Greifswalde*, *Wick*, Eldena, and Kostenhagen, contain carbonate and nitrate of ammonia. Ammoniacal salts have been discovered in many mineral springs in *Kissingen* and other places. The ammonia of these salts can only arise from the atmosphere.

Any one may satisfy himself of the presence of ammonia in rain, by simply adding a little sulphuric or muriatic acid to a quantity of rain-water, and evaporating this nearly to dryness in a clean porcelain basin. The ammonia remains in the residue, in combination with the acid employed; and may be detected either by the addition of a little chloride of platinum, or more simply by a little powdered lime, which separates the ammonia, and thus renders its peculiar pungent smell sensible. The sensation which is perceived upon moistening the hand with rain-water, so different from that produced by pure distilled water, and to which the term *softness* is vulgarly applied, is also due to the carbonate of ammonia contained in the former.

The ammonia, which is removed from the atmosphere by rain and other causes, is as constantly replaced by the putrefaction of animal and vegetable matters. A certain portion of that which falls with the rain, evaporates again with the water; but another is, we suppose, taken up by the roots of plants, and, entering into new combinations in the different organs of assimilation, produces albumen, gluten, quinine, morphia, cyanogen, and a number of other compounds containing nitrogen. The chemical characters of ammonia render it capable of entering into such combinations, and of undergoing

numerous transformations. We have now only to consider whether it really is taken up in the form of ammonia by the roots of plants, and in that form applied to their organs to the production of the azotized matters contained in them. This question is susceptible of easy solution, by well-known facts.

In the year 1834, I was engaged with Dr. Wilbrand, Professor of Botany in the University of Giessen, in an investigation respecting the quantity of sugar contained in different varieties of maple-trees, which grew upon soils which were not manured. We obtained crystallized sugars from all, by simply evaporating their juices, without the addition of any foreign substances; and we unexpectedly made the observation, that a great quantity of ammonia was emitted from this juice, when mixed with lime, and also from the sugar itself during its refinement. The vessels, which hung upon the trees in order to collect the juice, were watched with great attention, on account of the suspicion that some evil-disposed persons had introduced urine into them, but still a large quantity of ammonia was again found in the form of neutral salts. The juice had no color, and had no reaction on that of vegetables. Similar observations were made upon the juice of the birch-tree; the specimens subjected to experiment were taken from a wood, several miles distant from any house, and yet the clarified juice, evaporated with lime, emitted a strong odor of ammonia.

In the manufactories of beet-root sugar, many thousand cubic feet of juice are daily purified with lime, in order to free it from vegetable albumen and gluten, and it is afterwards evaporated for crystallization. Every person, who has entered such a manufactory, must have been astonished at the great quantity of ammonia which is volatilized along with the steam. This ammonia must be contained in the form of an ammoniacal salt, because the neutral juice possesses the same characters as the solution of such a salt in water; it acquires, namely, an acid reaction during evaporation, in

consequence of the neutral salt being converted by loss of ammonia into an acid salt. The free acid which is thus formed is a source of loss to the manufacturers of sugar from beet-root, by changing a part of the sugar into uncrystallizable grape sugar and syrup.

The products of the distillation of flowers, herbs, and roots, with water, and all extracts of plants made for medical purposes, contain ammonia. The unripe, transparent, gelatinous pulp of the almond and peach emit much ammonia when treated with alkalies,—*(Robiquet.)* The juice of the fresh tobacco leaf contains ammoniacal salts. The water which exudes from a cut vine, when evaporated with a few drops of muriatic acid, also yields a gummy deliquescent mass, which evolves much ammonia on the addition of lime. Ammonia exists in every part of plants, in the roots (beet-root,) in the stem, (of the maple-tree,) and in all blossoms and fruit in an unripe condition.

The juice of the maple and birch contain both sugar and ammonia, and, therefore, afford all the conditions necessary for the formation of the azotized components of the branches, blossoms, and leaves, as well as those which contain no azote or nitrogen. In proportion as the developement of those parts advances, the ammonia diminishes in quantity, and when they are fully formed, the tree yields no more juice."

"Nitrogen is found in lichens, which grow on basaltic rocks. Our fields produce more of it than we have given them as manure, and it exists in all kinds of soils and minerals, which were never in contact with organic substances. The nitrogen in these cases could only have been extracted from the atmosphere.

We find this nitrogen in the atmosphere in rain-water and in all kinds of soils, in the form of ammonia, as a product of the decay and putrefaction of preceding generations of animals and vegetables. We find, likewise, that the proportion

of azotized matters in plants is augmented by giving them a large supply of ammonia, conveyed in the form of animal manure.

No conclusion can then have a better foundation than this, that it is the ammonia of the atmosphere which furnishes nitrogen to plants.

Carbonic acid, water, and ammonia, contain the elements necessary for the support of animals and vegetables. The same substances are the ultimate products of the chemical processes of decay and putrefaction. All the innumerable products of vitality resume after death the original form from which they sprung; and thus death,—the complete dissolution of an existing generation,—becomes the source of life for a new one."

ART. LI.—AN EXAMINATION OF THE TESTIMONY RELATIVE TO THE EFFICACY OF THE HYDRATED PEROXIDE OF IRON AS AN ANTIDOTE TO ARSENIC, WITH DIRECTIONS FOR ITS PREPARATION AND EXHIBITION. By T. ROMEYN BECK, M. D.

It is now about six years since the use of the peroxide of iron was introduced to the notice of the public. It has been made the subject of numerous, and for the most part satisfactory, experiments on animals; it has been frequently exhibited to persons poisoned with arsenic, and in many instances with success; it is also a substance very easily prepared, and one that can always be kept on hand, either by the physician or druggist.

These circumstances might be supposed sufficient to establish firmly the character of any antidote, and I do not doubt but that it is thus viewed by those who have from time to time noticed the testimony adduced in its favor. But this has, in many instances, consisted of brief notices of successful cases or experiments, scattered through the selections and summaries of Medical Journals, and hence has possibly not made that impression which a collection of the whole would produce. With a view to promote that desirable object, and at the same time to urge an early exhibition of this substance in all cases of poisoning by arsenic, I have ventured to prepare the following observations. I propose to follow the following order. 1. A notice of the discovery. 2. The results of experiments on animals. 3. The efficacy of its exhibition on man. 4. The mode of its preparation and exhibition.

I. The earliest notice that I have seen of the efficacy of peroxide of iron as an antidote, is contained in a letter addressed to M. Poggendorf, the editor of a German Scientific Journal by Dr. Bunsen, bearing date Gottingen, May 1,

1834.* In the same year Drs. Bunsen and Berthold jointly addressed a communication on the same subject to the Academy of Sciences at Paris.† It had been previously established by the experiments of Renault and others, that the native arsenite of iron (mispickel) is nearly innocuous to animals, and on this fact, the investigations of Drs. Bunsen and Berthold seem to have been founded. They also ascertained that "a solution of arsenious acid is so completely precipitated by pure hydrate of iron recently precipitated and suspended in water, that a current of sulphuretted hydrogen gas passed into the liquor after filteration, and the addition of a small quantity of muriatic acid, does not indicate the presence of the smallest quantity of arsenious acid." Again, if a few drops of ammonia be added to the peroxide, and it be digested in a gentle heat, with arsenious acid, reduced to fine powder, a sub-perarsenite of iron is formed, which is perfectly insoluble. Encouraged by these results, they proceeded to perform

II. *Experiments on animals.* From four to eight grains of arsenic were given to two young dogs, and the œsophagus was tied to prevent vomiting, and the peroxide was then exhibited. They lived more than a week without manifesting any of the symptoms of poisoning. A quantity equal to four or six drachms of the peroxide was deemed sufficient to transform in the stomach eight or ten grains of arsenious acid into insoluble arsenite. As, however, the hydrated oxide is innocuous, they advise its use in much larger quantity. Rabbits also which are destroyed by very small doses of arsenic, were saved by the antidote.

Orfila and Le Sueur repeated these experiments on animals and generally with favorable results. They found, however, that if the administration of the antidote was delayed beyond half an hour, all the symptoms of poisoning occurred, and

* London and Edinburg Philosophical Magazine, vol. vi. p. 237.

†Lancet, Oct. 18th, 1834, and American Journal Medical Sciences, February, 1835, p. 537.

death was the termination.* M. Bouley, Jun., of Alfort, made an elaborate series of experiments on horses, and which were published in 1835. He ascertained, in the first place, that the peroxide was totally inefficacious in poisoning by arseniate of potash, (Fowler's solution,) and for a manifest reason—the iron cannot overcome the affinity existing between its constituents. But when he gave white arsenic in doses of two ounces and upwards, and followed it by sixty-four ounces of the hydrated oxide, the animals survived. In several instances, the horses thus treated were killed at the end of nine days, and the stomach and intestines bore the marks of the action of the poison, but evidently in a mitigated degree, and sufficient to show that it had been promptly counteracted. In one case, the antidote was delayed twenty-five hours, and the consequence was, the death of the animal twenty-four hours thereafter, and the stomach, intestines and heart bore marks of the violence of the poison.†

MM. Miguel and Soubeiran of Paris were probably the next experimenters. They found that if a large dose of arsenic was given to dogs, and they were allowed to vomit, it produced no effect, and it was therefore necessary to tie the œsophagus. But this in itself is a fatal operation, and the time that the animal could survive required to be ascertained. A dog whose œsophagus was tied, died in seventy-eight hours, but if nine or ten grains of arsenic were given, and the œsophagus then tied, death followed in two or two and a half hours. In their experiments they used the recently prepared peroxide of hydrated iron mixed with water, in the proportion of twelve parts, to one of white arsenic.

In several instances of dogs thus treated, they survived from seventy-eight hours to six days. But if the exhibition of the antidote was delayed, the animals perished, and the

* American Journal of Medical Sciences, vol. xvi. p. 239.

† Annales C'Hygiene, vol. xii. p. 134; American Journal, August, 1835, p. 518.

time of death appeared to be hastened exactly in proportion to the delay.*

Again, Drs. Borelli and Demaria, of Turin, performed experiments also on dogs with even more favorable results. They consider that four and a half parts by weight of the peroxide are required to neutralize one of arsenious acid,†

Dr. Van Specz, of Vienna, had similar success. He gave arsenic both in powder and in solution, and though in the last the symptoms were more violent, yet in all the animals recovered. He even exhibited the rust of iron successfully.‡

Dr. Donald Mackenzie, of Edinburgh, has related a number of successful experiments on dogs, with arsenic in the solid form, followed by the antidote in the proportion of from twelve to thirty parts. They were killed, either on the first, third, or sixth day after, and the stomach and intestines were found but slightly reddened.§

Lastly I may mention the result obtained by a committee of the Academy of Medicine at Paris, in which not only the hydrated peroxide was found efficient on dogs, but also the common subcarbonate of iron largely suspended in water, four ounces in twenty-four of water. The committee advise that at least half an ounce of peroxide should be taken for each grain of arsenious acid supposed to remain in the stomach.‖

To all this mass of favorable testimony, there can only be opposed the unfavorable results obtained by Mr. Brett and Mr. Orton, (*London Medical Gazette*, vol. xv. p. 220, *Lancet*, November 8, 1834.) But it must be remembered that these investigations were made at an early period of the inquiry; and I may further adopt the remarks of Dr. Maclagan,

* British and Foreign Medical Review, vol. i. p. 594.

† British and Foreign Medical Review, vol. i. p. 595.

‡ American Journ. Med. Sci., February, 1838, p. 519.

§ Lancet, April 4, 1840. American Journal Medical Science, August, 1840, p. 497.

‖ American Journal Med. Sci., February, 1838, p. 519.

of Edinburgh, concerning them. "With respect to the former it may be observed, that he appears uniformly to have used too small quantities of the oxide, and the experiments of the latter hardly seem to have been made with sufficient care, as appears in one instance, at least, from his having injected both poison and antidote into the lungs, instead of the stomach of the rabbit.*

III. *Its Efficacy as an Antidote on Man.* In referring to these, I must be brief, indicating merely the leading points worthy of notice.

1. The first case on record is probably that of M. Leger. A child eighteen months old, drank a solution of fly poison, (probably a variable combination of black oxide of arsenic and oxide of cobalt,) and was immediately seized with symptoms of violent colic. The accident was soon discovered, and the hydrated peroxide was instantly given. Its effects were completely successful within a few hours. *American Journal of the Medical Sciences*, vol. xvi. p. 239.

2. M. Geoffroy, of Paris, gave it in twenty minutes after arsenic, stirred about in water, had been swallowed by a man aged 36. Four or five pints of water, charged with it, were given in a quarter of an hour. Vomiting ensued; but the patient suffered none of the ordinary symptoms of arsenic. He had taken a drachm and a half of arsenic. The next morning he was well. *British and Foreign Medical Review*, vol. i. p. 572. *American Journ. Med. Sci.*, February, 1836, p. 501.

3. Drs. Bineau and Majesté of Saumur, in France, related

* *On the action of the Hydrated Sesquioxide of Iron on Arsenic*, by Douglass Maclagan, M. D., Lecturer on Materia Medica. *Edinburg Medical and Surgical Sournal*, volume liv. page 106. This is a valuable paper in reference to the chemical action of these substances on each other. I have only space to notice the conclusion to which he arrives, and which is, that "the hydrated oxide of iron is a real chemical antidote to arsenious acid, and that when it removes arsenic from solution and soluble combinations, it acts by chemically uniting with it." The large quantities which have been found necessary, are required, not to protect the stomach mechanically, but to render the poison chemically inert.

five cases that occurred in 1835. As many little girls aged from five to nine years, on leaving school, ate part of a cake containing one-fifth of its weight of white arsenic which had been prepared to kill rats. They all were affected violently with the early symptoms of poisoning, and were not seen until two hours or more after the accident, yet all recovered by the free use of the antidote. *B. and F. Medical Review*, volume i. p. 573.

4. Dr. Buzorini relates in *La Lancette Francais*, November 17, 1835, two cases successfully treated. *Amer. Journ.* Aug. 1836, p. 504.

5. Dr. Clinton of New York, in the United States, *Medical and Surgical Journal*, vol. iii. p. 54, also relates a successful case.

6. Mr. Robson, of Warrington, administered with success, first, the subcarbonate of iron, in doses of six drachms, two hours after the poison had been taken, and afterwards the prepared oxide. Nearly three drachms of arsenic had been swallowed. *American Journal of Medical Science*, May, 1837, p. 222.

7. Dr. Thomas, of Baltimore, in a case where twenty grains of arsenic in powder had been given, gave the peroxide with success. *Amer. Med. Intel.*, vol. ii. p. 117.

8. Mr. Macdonald—a successful case in *New York Journ. of Medicine and Surgery*, vol. ii. p. 205.

9. Dr. Gerhard—a successful case in the *Philadelphia Medical Examiner*, vol. iii. p. 250.

10. Drs. Smiley and Wallace in the *Philadelphia Medical Examiner*, vol. iii. p. 679, out of a family of eight persons poisoned by a pudding of Indian meal, prepared for rats, death followed in two cases in seven and nine hours. They could not retain the antidote, but immediately rejected it. The symptoms of all the others were immediately mitigated by its use, and they all recovered.

11. Dr. Murray, of India, successful. *American Journ. Med. Sci.*, Feb., 1839, p. 503, from the *Calcutta Medical Journ.* Dec., 1837.

12. Mr. Deville, of Paris, successful. *Amer. Journ. Med. Sci.*, May, 1839, p. 243.

13. Dr. Puchelt, Jun., seven cases of recovery. *Edinburgh Med. and Surg. Journ.*, vol. liv. p. 263.

It would not be difficult to add considerably to this list. But I have adduced enough to warrant a belief in the efficacy of the antidote. I trust, however, that none of my readers will be led to suppose, that in cases of poisoning by arsenic, they are to depend *solely* on it. Vomiting should be promoted as early as possible, and indeed every mode now in use for the speedy evacuation of the poison. The antidote will find sufficient to operate on what still remains and cannot be removed.

IV. *The Mode of Preparation and Exhibition.* Lassaigne had recommended the following process. Take iron turnings, pour on them four times their weight of the nitric acid of commerce gradually, so as to avoid too rapid an action. A portion of the nitric acid will yield its oxygen to the iron, and change it to a peroxide, which unites with the undecomposed nitric acid, and forms pernitrate of iron. As soon as the action of the nitrous vapor has ceased, add ten or twelve parts of water to dissolve the pernitrate and to precipitate the undissolved turnings. Decant and filter the solution, and add aqua ammonia, until litmus paper becomes blue. A yellowish brown precipitate is formed, which is the hydrate, and which should be washed with boiling water, to free it from the remains of the acid.

Drs. Bunsen and Berthold, however, prefer that preparation obtained by taking a pure solution of the sub-sulphate of iron, increasing its dose of oxygen by heating it with nitric acid, and then pouring into the solution an excess of caustic ammonia. The hydrated oxide is now obtained by decantation. They advise that the nitric acid be added in small portions at a time, otherwise a quantity of the neutral sulphate of the sesquioxide is separated in the form of a yellow powder, which is but slightly soluble. They also insist on the danger of using any other alkali than ammonia.

The Edinburgh college has introduced it into its pharmacopœia, with nearly identical directions, which I copy from Dr. Maclagan's paper, already referred to. "Dissolve sulphate of iron in water, with a little sulphuric acid, adding nitric acid by degrees till it is thus fully oxygenated, and then precipitating the hydrated sesquioxide from this solution by an excess of ammonia. The product thus obtained is of a deep reddish brown." It should be carefully washed, to remove the ammonia; but this can hardly be completely affected without the application of heat; and I apprehend that this last is not to be recommended.

The dry hydrated oxide is inert. It is therefore necessary to keep the antidote, when prepared, under water. It may thus be preserved uninjured in its qualities for a length of time. Professor Fisher, of Maryland, has shown this conclusively in an elaborate paper in the twelfth volume of the *American Journal of Pharmacy.* "In the moist state, it is in the finest possible state of division, and hence best adapted as an antidote."

It is not necessary therefore to have it *freshly prepared* for every case, and the practitioner has only to keep a quantity on hand in closely stopped bottles, remembering to shake it well before administration.

As to the quantity necessary to be given, I will again quote Dr. Maclagan. "As far as chemical evidence goes, at least twelve parts of oxide, prepared by ammonia, and moist, are required for each part of arsenic, and this same proportion has been indicated by several of the French experimentalists as being required to insure its antidotal effects."

But it may be said that in some instances we cannot ascertain how much arsenic has been taken, and the inquiry may be renewed, how are we then to act. To this, I reply, by recommending that to an adult, a tablespoonful, and for children a desert spoonful, should be given every five or ten minutes until relief from the urgent symptoms is obtained.

ALBANY, May 19, 1841.

Amer. Journ. Med. Sci.

ART. LII.—"AN ACCOUNT OF SOME RECENT IMPROVEMENTS IN PHOTOGRAPHY. By H. F. TALBOT, Esq. F. R. S."

THE author had originally intended, in giving an account of his recent experiments in photography, to have entered into numerous details with respect to the phenomena observed,—but finding that to follow out his plan would occupy considerable time, he has thought that it would be best to put the Society, in the first place, in possession of the principal facts, and by so doing perhaps invite new observers into the field during the present favorable season for making experiments. He has, therefore, confined himself at present to a description of the improved Photographic method, to which he has given the name of *Calotype*, and reserves for another occasion all remarks on the theory of the process.

The following is the method of obtaining the Calotype pictures.

Preparation of the paper.—Take a sheet of the best writing paper, having a smooth surface and a close and even texture.

The water mark, if any, should be cut off lest it should injure the appearance of the picture. Dissolve one hundred grains of crystallized nitrate of silver in six ounces of distilled water. Wash the paper with this solution, with a soft brush, on one side, and put a mark on that side whereby to know it again. Dry the paper cautiously at a distant fire, or else let it dry spontaneously in a dark room. When dry, or nearly so, dip it into a solution of iodide of potassium, containing five hundred grains of that salt dissolved in one pint of water, and let it stay two or three minutes in this solution. Then dip it into a vessel of water, dry it lightly with blotting paper, and finish drying it at a fire which will not injure it even if held pretty near; or else it may be left to dry spontaneously.

All this is best done in the evening by candle light. The paper so far prepared, the author calls *iodized* paper, because it has a uniform pale yellow coating of iodide of silver. It is scarcely sensitive to light, but nevertheless it ought to be kept in a portfolio drawer until wanted for use. It may be kept for any length of time without spoiling or undergoing any change if protected from the light. This is the first part of the preparation of calotype paper, and may be performed at any time. The remaining part is best deferred until shortly before the paper is wanted for use. When that time is arrived, take a sheet of the iodized paper and wash it with a liquid prepared in the following manner:—

Dissolve one hundred grains of crystallized nitrate of silver in two ounces of distilled water, add to this solution one sixth of its volume of strong acetic acid. Let this mixture be called A.

Make a saturated solution of crystallized gallic acid in cold distilled water. The quantity dissolved is very small. Call this solution B.

When a sheet of paper is wanted for use, mix together the liquids A and B in equal volumes, but only mix a small quantity of them at a time, because the mixture does not keep long without spoiling. I shall call this mixture the *gallo-nitrate of silver*.

Then take a sheet of *iodized paper* and wash it over with this *gallo-nitrate of silver* with a soft brush, taking care to wash it on the side which has been previously marked. This operation should be performed by candle light. Let the paper rest half a minute, and then dip it into water. Then dry it lightly with blotting paper, and finally dry it cautiously at a fire, holding it a considerable distance therefrom. When dry, the paper is fit for use. The author has named the paper thus prepared *calotype paper*, on account of its great utility in obtaining the pictures of objects with the camera obscura. If this paper be kept in a press it will often retain its qualities in perfection for three months or more, being ready for use at any moment; but this is not uniformly the

case, and the author therefore recommends that it should be used in a few hours after it has been prepared. If it is used immediately, the last drying may be dispensed with, and the paper may be used moist. Instead of employing a solution of crystallized gallic acid for the liquid B, the tincture of galls, diluted with water, may be used, but he does not think the results are altogether so satisfactory.

Use of the paper.—The *calotype paper* is sensitive to light in an extraordinary degree, which transcends a hundred times, or more, that of any kind of photographic paper hitherto described. This may be made manifest by the following experiment:—Take a piece of this paper, and having covered half of it, expose the other half to day light for the space of *one second*, in dark cloudy weather in winter. This brief moment suffices to produce a strong impression upon the paper. But the impression is latent and invisible, and its existence would not be suspected by one who was not forewarned of it by previous experiments.

The method of causing the impression to become visible is extremely simple. It consists in washing the paper once more with the *gallo-nitrate of silver*, prepared in the way before described, and then warming it gently before the fire. In a few seconds the part of the paper upon which the light has acted begins to darken, and finally grows entirely black, while the other part of the paper retains its whiteness. Even a weaker impression than this may be *brought out* by repeating the wash of gallo-nitrate of silver, and again warming the paper. On the other hand, a strong impression does not require the warming of the paper, for a wash of the gallo-nitrate suffices to make it visible, without heat, in the course of a minute or two.

A very remarkable proof of the sensitiveness of the *calotype paper* is afforded by the fact stated by the author, that it will take an impression from simple moonlight not concentrated by a lens. If a leaf is laid upon a sheet of the paper, an image may be obtained in this way in from a quarter to half an hour.

This paper being possessed of so high a degree of sensitiveness is, therefore, well suited to receive images in the camera obscura. If the aperture of the object lens is one inch, and the focal length fifteen inches, the author finds that *one minute* is amply sufficient, in summer, to impress a strong image upon the paper of any building upon which the sun is shining. When the aperture amounts to one-third of the focal length, and the object is very white,—as a plaster bust, &c.—it appears to him that *one second* is sufficient to obtain a pretty good image of it.

The images thus received upon the calotype paper are, for the most part, invisible impressions. They may be made visible by the process already related, namely, by washing them with the gallo-nitrate of silver and then warming the paper. When the paper is quite blank, as is generally the case, it is a curious and beautiful phenomenon to see the spontaneous commencement of the picture, first tracing out the stronger outlines, and then gradually filling up all the numerous and complicated details. The artist should watch the picture as it developes itself, and when, in his judgment, it has attained the greatest degree of strength and clearness, he should stop further progress by washing it with the fixing liquid.

The fixing process.—To fix the picture, it should be first washed with water, then lightly dried with blotting paper, and then washed with a solution of *bromide of potassium,* containing one hundred grains of that salt dissolved in eight or ten ounces of water. After a minute or two it should be again dipped in water, and finally dried. The picture is in this manner very strongly fixed, and with this great advantage, that it remains transparent, and that therefore there is no difficulty in obtaining a copy from it. The calotype picture is a *negative* one, in which the lights of nature are represented by shades; but the copies are *positive,* having the lights conformable to nature. They also represent the objects in their natural position with respect to right and left. The copies may be made upon calotype paper in a very short

time, the invisible impressions being *brought out* in the way already described. But the author prefers to make the copies upon photographic paper prepared in the way which he originally described in a memoir read to the Royal Society, in February, 1839, and which is made by washing the best writing paper, *first*, with a weak solution of common salt, and *next*, with a solution of nitrate of silver. Although it takes a much longer time to obtain a copy upon this paper, yet, when obtained, the tints appear more harmonious and pleasing to the eye; it requires in general from three to thirty minutes of sunshine, according to circumstances, to obtain a good copy on this sort of photographic paper. The copy should be washed and dried, and the fixing process (which may be deferred to a subsequent day) is the same as that already mentioned.

The copies made by placing the picture upon the photographic paper, with a board below and a sheet of glass above, and pressing the papers into close contact by means of screws, or otherwise.

After a calotype picture has furnished several copies, it sometimes grows faint, and no more good copies can then be made from it. But these pictures possess the beautiful and extraordinary property of being susceptible of revival. In order to revive them and restore their original appearance, it is only necessary to wash them again by candle light with gallo-nitrate of silver, and warm them: this causes all the shades of the picture to darken greatly, while the white parts remain unaffected. The shaded parts of the paper thus acquire an opacity, which gives a renewed spirit and life to the copies of which a second series may now be taken, extending often to a very considerable number. In reviving the picture it sometimes happens that various details make their appearance which had not before been seen, having been latent all the time, yet nevertheless not destroyed by their long exposure to sunshine.

The author terminates these few observations by stating a few experiments calculated to render the mode of action of the sensitive paper more familiar, viz:—

1st. Wash a piece of the *iodized paper* with the gallo-nitrate; expose it to daylight for a second or two, and then withdraw it. The paper will soon begin to darken spontaneously, and will grow quite black.

2d. The same as before, but let the paper be warmed. The blackening will be more rapid in consequence of the warmth.

3d. Put a large drop of the gallo-nitrate on one part of the paper, and moisten another part of it more sparingly, then leave it exposed to a very faint daylight; it will be found that the lesser quantity produces the greater effect in darkening the paper, and in general it will be seen that the most rapid darkening takes place at the moment when the paper becomes nearly dry; also, if only a portion of the paper is moistened, it will be observed that the edges or boundaries of the moistened part are more acted on by the light than any other part of the surface.

4th. If the paper, after being moistened with the gallo-nitrate, is washed with water, and dried, a slight exposure to daylight no longer suffices to produce so much discoloration; indeed, it often produces none at all. But by subsequently washing it again with the gallo-nitrate, and warming it, the same degree of discoloration is developed as in the other cases (experiments 1 and 2.) The dry paper appears, therefore, to be equal or superior in sensitiveness to the moist: only with this difference, that it receives a *virtual* instead of an actual impression from the light, which it requires a subsequent process to develope.

ART. LIII.—"NEW MODE OF PREPARATION OF THE DAGUERREOTYPE PLATES, BY WHICH PORTRAITS CAN BE TAKEN IN THE SHORT SPACE OF FROM FIVE TO FIFTEEN SECONDS, ACCORDING TO THE POWER OF LIGHT. Discovered by A. CLAUDET, in the beginning of May, 1841." Communicated by the Marquis of Northampton, President R. S.

"MY improvement," says the author, "consists in using for the preparation of the plates, a combination of chlorine with iodine, in the state of chloride of iodine. I follow the preparation recommended by Daguerre. After having put the plate in the iodine box for a short time, and before it has acquired any appearance of yellow color, I take it out and pass it for about two seconds over the opening of a bottle containing chloride of iodine, and immediately I put it again in the iodine box, where it acquires very soon the yellow color, which shows that the plate is ready to be placed in the camera obscura. I have substituted for the chloride of iodine chloride of bromine, and have found nearly the same result; but I prefer chloride of iodine as producing a better effect, and besides on account of the noxious smell of bromine.

"The result of my preparation is such, that I have operated in ten seconds with the same apparatus which, without any chlorine, required four or five minutes when using only the original preparation of Daguerre: I have obtained an image of clouds in four seconds."

London, Edinburgh, and Dublin Philosophical Journal.

ART. LIV.—ON THE SPONTANEOUS EVOLUTION OF SULPHURETTED HYDROGEN IN THE WATERS OF THE WESTERN COAST OF AFRICA AND ELSEWHERE.

In the course of a lecture on this subject, delivered at the Royal Institution, by Professor Daniell, he observed, that it was curious that the impregnation of the waters of Western Africa with this deleterious gas had so long escaped attention. In water seaward forty miles its presence can be detected; and it exists in considerable quantity in the Volta, in Lopez Bay, in the Grand Bonny, &c.; it spreads over an area of 40,000 square miles, from about 8° north to 8° south latitude. The origin of this vast accumulation of sulphuretted hydrogen, Mr. Daniell attributes, not to volcanic action, not to the decomposition of pyrites, nor to the process of the decay of animal matter, but to the action and reaction of the vegetable matter carried down by the tropical rivers, and the sulphates always more or less present in sea-water. This, moreover, he has proved by experiment. Last winter he placed some fallen leaves in a jar of new river-water; also a similar proportion in a second jar, with three ounces of salt, and in a third, with a like quantity of the sulphate of soda—all closely stopped, and a card-board, with acetate of lead, over each. After having been kept three months in a warm closet he examined them. The first emitted the common smell of decayed leaves; the second that of a pleasant conserve; but the third, no words could convey the stinking odor, nauseous beyond all description. This of itself was sufficient to establish the generation of sulphuretted hydrogen; but further, the usual blackening of the lead of the card-board in this jar only, left no doubt on the matter. Whenever, then, sea-water holding sulphates in solution mixes with fresh water and vegetable matter, this gas must be produced, and its effects on animal life are well known. It is a record in Italy, as well

as in Essex, that where the sea has been prevented flooding the mashes, that locality, previously very sickly, had become perfectly salubrious. To sulphuretted hydrogen, therefore, Mr. Daniell ascribes the dreaded malaria, as also the deadly stinking miasma of Africa, producing languor, nausea, disgust, and death. The jungle-fever of India, also, he thinks attributable to its presence. The soil abounds with sulphates of magnesia and soda ; must not, therefore, quantities of sulphuretted hydrogen be generated in the jungle-swamps? Besides the direful consequences to the health of man visiting the deadly shores of Africa, this sulphuretted hydrogen does him great injury in a commercial point of view. The copper-sheathing of vessels is rapidly destroyed. Mr. Daniell exhibited a sheet taken from the Bonetta in August 1840, on her return from the African station. Although new not many months before, it was eaten into holes, with a deposit on the one side of the protochloride of copper, and of the black sulphuret of copper on the other. A plate exhibited, taken from the Royal George, was in a good state in comparison with it. The latter had been acted on for sixty years by sea-water, but, be it remembered, by sea-water alone, not impregnated with sulphuretted hydrogen. On it there was no trace of a sulphuret. These, then, were the two principal and important points illustrated by Mr. Daniell; and the question put by him and answered in the affirmative, was, Can science indicate a remedy for these evils? For the former, fumigation with chlorine. Chlorine and sulphuretted hydrogen cannot co-exist. Chemical action instantly takes place ; sulphur is thrown down, hydrochloric acid formed, and malaria and miasma nowhere ; the destroyer destroyed. For the latter, the destructive agent is not decomposed, but its action is directed to a less costly material. Copper is to be protected by zinc, for which sulphuretted hydrogen has the stronger affinity ; and so long as the latter metal is present, the former is free from the attack of the gas in solution. This, it will be readily seen, is Sir H. Davy's principle, which involved the use of zinc or iron ; but in the

case of sulphuretted hydrogen, zinc and not iron must be employed. Mr. Daniell regretted that Davy's zinc-protectors had been so soon abandoned, and only because the copper, not acted upon by the muriatic acid, became a nucleus for earthy, vegetable, and animal matter, and the ship's bottom was in consequence fouled, as it is termed. The remedy for this, he said, was most simple. Let the protectors be so arranged that contact may be broken and renewed at will. The zincs and copper separated for a short time, the earth deposits would soon be removed. In consequence of Mr. Daniell's report to the Admiralty, chlorine has been furnished the Niger Expedition, and no ship hereafter will proceed to the African station without that purifier in store, nor without zinc-protectors for her copper. It is to be hoped that all ship-owners will follow the example of the Admiralty Board in this respect.—*Literary Gazette*, No. 1272.

Additional evidence of the active agency of Salt Water, when in contact with decaying Vegetable Matter, in generating Miasma, in a hot climate, contained in a letter from Professor Daniell to the Editor of "The Friend of Africa."

My Dear Sir,—The evidence of the worst cases of malaria being connected with the decomposition of the sulphates in sea-water increases upon me every day, and I have now the pleasure to send you an abstract of a paper, which you will find at length in the 29th volume of the Annales de Chimie, p. 225, by Signor Gaetano Giorgini, which offers the strongest possible confirmation of my opinion. I trust that it may tend to give confidence to the African expedition; for if we rightly know the cause of the pestiferous exhalations upon the coast, the prevention of ill effects is obvious and easy:—Steam through the salt-waters as fast as possible, and while obliged to be on them make a plentiful use of chlorine fumigation, which instantly decomposes the sulphuretted hydrogen.—I am, &c.

J. F. Daniell.

Captain Washington, R. N.

"The observation of Signor Giorgini has been drawn to the state of tbe atmosphere in the neighborhood of certain marshes on the borders of the Mediterranean; and by reference to historical data, and various documents, he has proved the great importance which attaches to the circumstance of their being at times in communication with the sea, so as to have a mixture formed between their waters and that of the sea. Both ancient and modern authors have announced the fatal effects produced in the neighborhood of marshes by such mixture, and a local belief of the same is very common and strong.

"On the south of the Ligurian Apennines, is a marshy shore, bounded on the west for twelve miles by the Mediterranean, on the south by the river Serchio, and on the north by the river Frigido, a torrent commencing at the foot of the Apennines in the state of Massa di Carrara, running three or four miles over the land, and then falling into the sea. The plain is from two to four miles wide, and is traversed by a few short torrents or streams; among these are the rivers Camajore and Pietra Santa, which divide the plain into three separate basins. The rain and spring waters which flow into the three basins mentioned, are slowly discharged into the sea by natural or artificial canals, penetrating the sand-bank, which exist on the sea side.

"The level of these stagnant waters is between that of high and low water in the neighboring sea, there being but little difference between these two points in this part of the Mediterranean. In this state of things, formerly, when the waters of the sea arose from any circumstance (unless the waters of the marshes were very high,) they used to return up the ditches, fill the basins, and inundate the country to the foot of the mountains; and with a north west wind the waves used to penetrate with force to the interior. The mixture of fresh and salt water thus formed, and which in summer was rarely changed, became corrupt, and spread infection over the neighborhood of the most destructive kind.

"In this way the effects of the malaria were reproduced

annually in the neighboring country with all their peculiar horrors: the population, though small, presented feeble infants and diseased men, old age being unknown there. All attempts to avoid the scourge, by living on the hills, or in the interior, and frequenting the plains when the business of cultivation essentially required it, were vain; they fell victims to the extensive influence, and such being the effects upon the inhabitants of the country, much more rapidly did a stranger suffer from the deleterious atmosphere ; one single night in the months of August and September causing inevitable death to the incautious traveller who should stay so long in this infested country.

"Such was the state of things till 1741. Previous to that time Gemignano Rondelli, Eustachio Manfredi, and Bernardino Zendrini had successively insisted upon the necessity of excluding the sea from these marshes ; and in 1740-41 a sluice with folding doors, competent to give emission to the waters of the marsh, but prevent the sea from entering, was constructed at the mouth of the Burlamacca. The most complete and unexpected success immediately followed upon, and has continued with this work. The year after its completion there were no appearances of the terrible maladies which previously appeared every year. The inhabitants soon recovered health, and the land being very fertile, the population rapidly increased, and is increasing at this moment. Viareggio has become a considerable town ; and so completely has all suspicion of its insalubrity disappeared, that the first families of the city of Lucca have for years built their summer seats there. Notwithstanding the success of the precautions taken at this part of the coast, the neighboring parts were long left a prey to the destroying influence of the mixed marsh-waters ; and the inhabitants around the basins at Motrone and Perotto were not considered until the year 1804. In the years 1809, 1810, 1811, similar means were taken, with the best effects, to the inhabitants of Montignoso and the vicinity ; and in 1812 a sluice was constructed on the Cinquale, which perfected the arrangements in this part, and made a large por-

tion of the country equally healthy with Viareggio. To complete the arrangement, it was now only required to guard the ditches of Montrone and Tonfalo with sluices; the former was finished in 1819, and the latter in 1821. Since that time the diseases of malaria have ceased so entirely at all points, that no other dangers are now incurred regarding the insalubrity of the atmosphere than such as may arise from neglect of these sluices, which the inhabitants of the country should regard as their palladium.—*Friend of Africa.*—No. 3.

Edinburgh Philos. Journ.

MISCELLANY.

Preparation of Urea.—The usual method of preparing urea, by precipitating it from urine by means of nitric acid, is attended with great expense of time and material. Professor Liebig has recently published the following new and easy method:

Twenty-eight parts of perfectly dried ferrocyanate of potash are mixed with fourteen parts of the black oxide of manganese, both finely powdered, the mixture heated on a smooth iron plate (not in a crucible,) over a coal fire to incipient redness, stirring frequently. The mass on cooling is washed out with cold water, and the liquid mixed with twenty and a half parts of dry sulphate of ammonia. It is advantageous to place aside the first strong ley obtained, and to dissolve the sulphate of ammonia at the common temperature, in the last water, and to add this to the first concentrated solution. Usually a strong precipitate of sulphate of potash is immediately formed, from which the liquid is separated by decantation; it is then evaporated in a water bath, or on some warm place, boiling being avoided, and the liquid poured off as long as it is possible from the deposite of sulphate of potash. It is then evaporated to dryness and treated with boiling alcohol of 80 to 90 per cent., which dissolves the urea, while the sulphate salts remain undissolved. In this manner four ounces of perfectly colorless and beautifully crystallized urea may be obtained from a pound of the ferrocyanate of potash. It frequently happens that the solution containing the sulphate of potash and urea is colored yellow by ferrocyanide of ammonium, or potassium, which dissolves in the alcohol and gives to the crystals of urea a yellowish color; it may easily be separated by the addition of a solution of copperas; after the separation of the prussian blue, carbonate of ammonia is added to the liquid, which decomposes the excess of iron salt, and the liquid becomes clear and colorless, and may be evaporated and treated as above.—August No. of *London, Edinburgh, and Dublin Philosophical Magazine, from Ann. de Chem. and Pharm.* vol. xxxviii. part 1.

Preparation of Azotic Gas. By M. Pelouze.—M. A. Rose has observed that monohydrated sulphuric acid combines directly with nitric oxide,

and absorbs very considerable quantities of it. Sulphate of ammonia being heated in this compound to about 322° Fahr., pure azotic gas, perfectly unmixed with nitrous or nitric oxide, was obtained. This experiment was varied by passing nitric oxide gas into concentrated sulphuric acid, mixed with sulphate of ammonia, and heated from about 300° Fahr. to 392°. The nitric oxide was decomposed as in the preceding experiment, and pure azotic gas was obtained; it is mixed with nitric oxide only when the disengagement is too rapid. M. Pelouze is of opinion that this method of preparing azotic gas may be advantageously employed.

Journ. de Pharm.

Concentration of Nitric Acid, by means of Sulphuric Acid. By M. Pelouze.—It is stated in different chemical treatises, that concentrated sulphuric acid, decomposes nitric acid into water, with which it combines, and hyponitrous acid. M. Pelouze doubted the accuracy of this statement, and was convinced that it was erroneous, by observing nitric acid distilled from a mixture of nitrate of ammonia, with great excess of sulphuric acid, at 212°.

500 parts of concentrated sulphuric acid were mixed with 100 of nitric acid of specific gravity 1.448; the mixture was slowly distilled and yielded 88 parts of nitric acid of specific gravity 1.520; this product freed from red vapor by a gentle heat was mixed with six and a half times its weight of concentrated sulphuric acid, unaccompanied by any sensible increase of temperature. The mixture was colorless, and yielded very dense white vapors of nitric acid. When heated to a temperature which never exceeded 302°, and was kept as near as possible to 212°, 82 parts of nitric aeid of specific gravity 1.520 were distilled; its density remained 1.520, and its boiling point was from 185° to 188° Fahr.

A third rectification with sulphuric acid effected no change either in the properties, density or color of the nitric acid.—*Journ. de Pharm.* t. xxvij. p. 275,) per *London, Edinburgh, and Dublin Philosoph. Mag.*

On the Microscopic Characters of healthy Milk.—By Professor Von D'Outrepont, of Wurzburg.—He has recently put to the test some of M. Donné's statements with reference to the characteristics of healthy milk, and has arrived at somewhat different conclusions, though he fully confirms Donné's statements with reference to the difference of the corpuscles in the colostrum and milk.

Professor Von D'Outrepont found that in the greater number of instances the peculiar granular bodies of the colostrum (*corps granuleux*) disappeared on the third day after delivery, and not on the sixth or tenth as stated by Donné. Even in those cases, however, in which they could still be detected on the tenth or twelfth day, the milk produced no injurious effects on the infant; nor did it indeed in some instances in which the milk re-

tained the characters of colostrum so long as a month after delivery. The milk of a female laboring under severe metro-peritonitis presented the characters of true milk, not of colostrum. That likewise from the left breast of a person whose right breast was in a state of suppuration presented all the characters of healthy milk, though pus-globules were mixed with the milk in the other breast. In two instances where the breasts became inflamed without suppurating, the milk continued to present all the characters of the healthy secretion and did not contain any of the granular bodies of the colostrum.

Professor D'Outrepont had the opportunity of examining the milk of a woman who, after having suckled her third child for some months, began to menstruate regularly. During the flow of the menses the child became indisposed to suck and suffered from vomiting, but recovered its health immediately on their cessation. During menstruation the milk possessed all the characters of colostrum, while at other times its apperance was precisely that of healthy milk. The secretion from the breasts of a woman who had never been pregnant, presented all the peculiarities of colostrum; that contained in the breasts of another woman who never suckled her children, though the glands were always full except during pregnancy, differed in no respect from healthy milk.—*British and Foreign Medical Review, from Neue Zeitschrift fur Gebertskunde. Bd.* x. *Heft* i.

On a sedative Lotion in headachs, Congestions, and Cerebral Fevers. By M. Raspail.—Professor Raspail, in a letter to the editor of *l'Experience*, gives the mode of preparing a lotion, the sedative effect of which, he says, is almost instantaneous. It is as follows:

Liquor of ammonia (Qy. the strength?)	100 pts.
Distilled water,	900 "
Purified marine salt,	20 "
Camphor,	2 "

Essence of rose, or some other scent, in the necessary proportion.
The whole dissolved cold.

A piece of linen is to be steeped in this solution and applied over the part of the head that the patient points out as the seat of pain, taking care, if it is on the forehead, to apply a thick bandage over the eyebrows, to prevent any drops of the fluid passing into the eyes.

M. Raspail says he has seen headachs intolerably violent, accompanied by photophobia, and retraction of the globes of the eye, disappear completely, from a quarter to half an hour after the application of one wetted cloth. The linen is to be soaked as often as a new access of pain is threatened, and left on the head until it is necessary to soak it anew. In the numerous trials the author has made with this solution, first on him-

self, and afterwards on others, he has been struck by two circumstances of interest in connection with organic chemistry and symptomatology. When in a violent attack of cerebral fever, we apply on the principal seat of the inflammation a concentrated solution of marine salt, an evident odor of chlorine is disengaged, the diseased reaction being analogous to the decomposing and deoxygenating action of manganese, in the elimination of chlorine from marine salt, by means of sulphuric acid. Is this sign constant in affections of this class? It is for experience to decide. When, on the contrary, we employ a solution of ammonia, a strongly characterized *hircine* (goatish) odor is manifested. The same odor has been disengaged on the application of hydrochloric acid to the skin. M. Raspail has drawn the attention of the profession to this subject in order that they may employ this formula, and fix their attention on the analysis of the disengaged substances, as they may become characteristic of special affections.

Ibid, from l'Experience. 24 *Juillet*, 1840.

Remarks on the Tinctura Opii Ammoniata of the Edinburg Pharmacopœia. By J. H. Gilbert, Nottingham. Being a student in the laboratory of the Glasgow Royal Infirmary during the summer of 1839, it was occasionally my duty to dispense the *Tinctura Opii Ammoniata*,—a preparation, the apparently unchemical composition of which led me to suspect, that as far as the opium employed is concerned, it could be of no utility; it being well known that ammonia acts as a precipitant to morphia. It is true that a great excess of that alkali will, in some solutions of the salts of morphia, either prevent its precipitation, or redissolve it when precipitated. In order, therefore, to ascertain the fact in the present instance, I submitted several separate portions of the tincture to examination at Dr. Thompson's laboratory, where also I was a student.

Two ounces were first boiled in a flask with magnesia; the magnesian precipitate collected and boiled with alcohol; the alcoholic solution filtered while hot, and set aside in a warm situation to evaporate slowly: no crystals were deposited, and the residual matter, when tested; was found to contain no morphia.

Four ounces were next treated in a manner varying from the above. The liquid, previous to further treatment, was saturated with dilute acid; for when, as before stated, morphia has been held in solution by an excess of ammonia, I have found that after expelling the greater part of that excess by gentle heat, and then saturating with dilute acid, a salt may be obtained; from the solution of which the morphia may be separated by the usual means. In the present case, however, no morphia was detected.

Having thus failed to detect that principle in the filtered tincture, the dregs of a known quantity were macerated for some time in water acidulated with muriatic acid;—the filtered liquid, after being digested with ani-

mal charcoal, was sufficiently concentrated on a water bath, and set aside when a large quantity of crystals of muriate of morphia was deposited. A part of these were treated with ammonia, and the morphia tested in a separate state with a neutral solution of the perchloride of iron; and part, while in the state of muriate, was tested with iodic acid in the usual manner. As the dregs employed were not exhausted, nor the mother liquor treated with ammonia, an accurate quantitative result could not be obtained; but the amount of muriate of morphia was so great that it could not fall much short of the average produce of such a quantity of opium.

These experiments I had considered as conclusive. But, finding the new Edinburgh Pharmacopœia retained the old formula, and that the remarks made on the tincture by various writers on materia medica and pharmacy seemed to indicate previous experiment, I feared that either too small a quantity had been operated upon, or that some source of error had been overlooked. To obviate any such mistake, several portions, each of twelve ounces, were successively examined; in none, however, was morphia detected. As a check to the processes, several portions also of tincture of opium, (each of which would contain, by estimate, a quantity of opium equivalent to that in twelve ounces of the ammoniated tincture,) were treated in precisely the same modes as the ammoniated tincture had been. In these cases morphia was separated without difficulty; thus proving the efficacy of the processes.

It may be observed, that, before any of the tinctures were boiled with magnesia, the greater part of the ammonia and alcohol in the one, and of alcohol in the other, was expelled by gentle heat on the water-bath; as, in some cases, the alcohol in the liquid would be sufficient to take up the morphia after the decomposition of its salts by magnesia. The loss of ammonia caused no deposition of morphia.

These facts seem to show that, if as I believe is universally admitted, the medicinal effects of opium are attributable chiefly, if not entirely to the morphia which it contains, the opium employed in this tincture might with advantage be omitted.—*Edinburgh Medical and Surg. Journ.*

THE

AMERICAN JOURNAL

OF

PHARMACY.

PUBLISHED BY AUTHORITY OF

The Philadelphia College of

EDITED BY

JOSEPH CARSON, M.D.
Professor of Materia Medica and Pharmacy in

AND

ROBERT BRIDGES, M.D.

ASSISTED BY A PUBLISHING COMMITTEE,

CONSISTING OF AMBROSE SMITH, PROFESSOR F ELLIS, PROFESSOR WOOD, PROFESSOR AUGUSTINE DUHAMEL, WM. PROCTER AND ELIAS DURAND.

VOL. XIII.
NEW SERIES.—VOL. VII.—NO
JANUARY, 18[illegible]

PHILADELPHIA:
MERRIHEW AND THOMPSON, PRINTERS, NO. 7 CARTER'S ALLEY.
Price $2 50 a year, in advance.

THE
AMERICAN JOURNAL
OF
PHARMACY.

JANUARY, 1842.

ART. LV.—REPORT OF THE COMMITTEE OF REVISION, ON THE NEW PHARMACOPŒIA, MADE TO THE COLLEGE, AT A SPECIAL MEETING, NOV. 6th, 1841.

To the President and Members of the Philadelphia College of Pharmacy.

GENTLEMEN :—"The Committee of Revision," appointed on the 30th day of March, last, to whom was assigned the duty of examining and amending the U. S. Pharmacopœia, having now reached a position in which they find themselves prepared to submit their labors to the College, and to retire from the highly responsible and important trust with which they have been honored, respectfully proffer a full and accurate account of their proceedings, together with a general statement of the result of their examination and revision in the annexed

REPORT.

The character and extent of the duties which have occupied the Committee for a period of nearly eight months, are such that a minute detail of them to the College, and a review of them by it, cannot possibly be expected, much less accomplished; and it will, therefore, be necessary that such a confidence shall be reposed in the Committee by the College, as will allow it to sanction or adopt the revised edition which the Committee here present, without the close scrutiny and inspection which, under other circumstances, could scarcely be dispensed with.

While asking such an unlimited trust in the faithful and correct discharge of their duties, the Committee hope to be enabled to establish their claim thereto by the exhibition of the general principles by which their proceedings have been governed, as well as the particular mode in which the revision and amendment has been conducted. In addition to the insight which such a narative may give into the merits of the work which they have prepared, the Committee have the high satisfaction of exhibiting, in the actual result of formulæ, such evidence of their value as can with truth be said to be irrefutable. In the collection of specimens now before you, the Committee believe such evidence to exist, and they cheerfully rely upon the testimony of these mute witnesses to establish the claim which they prefer, for the confidence and reliance of their constituents, in other portions of their work not equally susceptible of demonstration. With this intimation the Committee will require the continued confidence of the College in the faithful execution of their trust, of which they consider their appointment an earnest. The Committee proceed to expose as much in detail as would prove useful and interesting, their action, and its results.

The proceedings of the Committee are recorded in two distinct journals, a division rendered necessary, by the entirely different character of the matter to be enrolled. These records are entitled, respectively, "The Journal of Amendments," and "Minutes of the proceedings of the Committee of Revision." The former containing purely professional matter; the latter a record designed to present a history of the organisation and action of the Committee. The Journal of Amendments in a systematic arrangement, details all the amendments of which the Committee recommend the adoption, together with the reasons which urged their proposal, and is therefore that portion of the work of the Committee which is to be subjected to the judgment of the Committee of the *National Convention*. The minutes of proceeding afford a faithful history of all that has occurred in the Committee since its appointment. A perusal of the two records will place within the knowledge of any one cu-

rious or interested in the subject, an exact history of the revision of 1840; and should a reference ever be made to the proceedings of the Committee by whom the revision was undertaken, either as a beacon to be shunned, or an example to be imitated, to these volumes reference may be made with perfect confidence in the accuracy and fidelity of the register. Could time now be afforded to bring before the notice of each member, every amendment, with its annexed comment, your Committee might refer simply to their journals for an account of their labors, and the College be spared the extended report with which the Committee is compelled to occupy your time; but as such a notice and examination is utterly impracticable by the College in its collective capacity, your Committee will endeavor, as briefly as possible, to present such an analysis and comment as will convey an idea of the character and extent of the revision which they have made; and as they trust will enable you, without hesitation, to extend to it the protection, and sanction your adoption of it as your own.

By the resolution under which the Committee received their appointment they are directed and required to take the entire charge of the work; to appoint a secretary, to subdivide into sections of such size as shall contribute most advantageously to a division of the labor, to fill vacancies which might occur in their body, to invite the co-operation of members and graduates of the College, to hold stated meetings at least once in two weeks, to keep a journal of proceedings, to arrange and compile the general results so as to produce a systematic work, to assign, as briefly as possible, the reasons for any changes which they might make, so that their propriety might be determined, to prosecute the work as rapidly as was consistent with due care and its proper execution, and to present to the College their work, as soon as finished, in a general report. Bound by these conditions, and guided by these directions, the Committee was directed to subject the Pharmacopœia to a complete revision, and generally, by removals, additions and amendments, by observation, experiment and

research, to bring the work up to the improved state of modern pharmacy, and to render it a type of the existing condition of the profession in this country. How well the Committee have understood the character of the duty thus imposed, and how faithfully they have respected and regarded the requisitions, must be determined by their report which follows, by the specimens upon your table, and by their journal and all their original documents herewith submitted, vouchers that their narrative is an uncolored, undisguised and impartial recital.

The first step which followed the announcement of their appointment, one or two days after the passage of the resolution of March 30th, was the organization of the Committee, which took place at a meeting held at the Hall of the College on the 7th of April, when every member, except one, who was prevented by indisposition, appeared, and undertook the duty to which he had been called. At this meeting, it was determined that it would be inexpedient to select a secretary from among their own number; and, as authorised, the Committee looked abroad among their associates and the graduates of our school, for aid in this department of their organization. They needed, for this service, one who, thoroughly acquainted with pharmacy and its kindred sciences, possessed, also, the enthusiasm, industry, and method, indispensible for the punctual and accurate discharge of the duty, laborious and extended as it promised to be; and such requisites they found subsequently to be possessed in an eminent degree by Mr. Wm. Procter, jr., to whom, by an unanimous call of the Committee, was assigned the place of secretary and collaborator. The Committee cannot withhold the expression of their warmest commendation for the manner in which the secretary has accomplished the object of his appointment; nor can they refrain from self-gratulation at having realized all the expectations which they had formed of the advantages which his acceptance of the trust would give. Thus much in justice to that officer, who, in addition to the arduous duties thus imposed, performed a prominent and most efficient part in the revision.

The further measures adopted, were to fix the periods for the stated meetings, to direct the preparation and publication of an address to the members and graduates of the College, inviting their co-operation, to direct the purchase of the necessary books and stationary, and to determine the subject for consideration at the ensuing meeting, which was fixed for the 21st inst. The measures thus proposed were all duly fulfilled; the stated meetings were fixed for every second Tuesday from the 7th of April. The address or invitation was prepared, published in the American Journal of Pharmacy, and distributed in the form of a circular especially addressed to every member and graduate, for the character of which see accompanying copy. The stationary and books were obtained; and at the ensuing meeting was commenced the actual revision of the Pharmacopœia, by entering upon an examination of the primary and secondary lists of the Materia Medica, and the table of weights and measures. It was now found to be expedient that more frequent meetings should be held than the College had directed, and accordingly, by adjournments, weekly sessions of the Committee took place, and continued from the 21st of April until the heat and increased demands upon the members for their professional labors, incident to that season, compelled the Committee, on the 30th of June, to adjourn until the 14th of July, and finally on that day to adjourn until the 25th of August, since which period the meetings have been regularly and punctually held on every second Tuesday.

The examinations and consequent discussions incident to a careful and thorough revision of the Materia Medica, occupied the Committee during seven of their sessions, independent of the attention and reflection, which, during the interval, engaged them individually. The number of the Committtee was increased, by the election, on the 21st of April, of Ambrose Smith and Augustine H. Duhamel, as collaborators. In the choice of these gentlemen, the Committee again found reason for congratulation in the active, zealous, and persevering attention, with which their co-operation was characterized. Many original suggestions

and valuable amendments have been derived from the three additional members, who had by this time been associated with the Committee.

As premised at the commencement of this report, it is impossible to designate here a tithe of the alterations, additions, and amendments, which the Committee have deemed it their duty to make; nor if here specified, could the College, without a repetition of the labor, undertake to determine their value. It may, however, suffice to say, that the Committee have thought proper to recommend the condensation of the primary and secondary lists of the Materia Medica into one, which is to be called "The Materia Medica," and is to contain all the substances which were regarded as officinal, and therefore required to be kept by the apothecary, either to be employed in their native state, slightly modified by pharmaceutic manipulations, or required in the execution of some formula, in the subsequent division of the Pharmacopœia, devoted to preparations. The place of the secondary lists is occupied by a list of indigenous and naturalized plants, employed in particular localities of the United States. This class of remedies appears to require some official notice, and yet their properties are not considered sufficiently established, nor is their use sufficiently general, to entitle them to an officinal rank. The Committee have also introduced a change in the mode of arrangement of these two lists which is considered a decided improvement. The change is, to place the Latin phrases, expressing the officinal name and portion employed, in one column on the left side of the page, while the translation of each into its English correlative is placed in an opposite column on the right side; with an intermediate column containing the systematic name. Thus, instead of

Hyoscyamus,	Hyoscyamus niger, W. 1.1010
Henbane,	BW 1.161.
	Folia, the leaves,

We shall have:

Hyoscyamus,		Henbane,
	Hyoscyamus niger,	
Folia,		The leaves.

The reasons which have induced this change are set forth in their Journal of Amendments, and it is hoped will be found sufficiently cogent to induce a concurrence in their views by the Committee of the National Convention. The Committee also adopted, as a general principle, the removal of all substances to the Materia Medica list from the preparations which are usually made by the manufacturing chemist and not by the apothecary. Among substances thus removed are all the essential oils, most of which are imported from foreign countries, none of which owe their preparation to the apothecary. In determining the botanical nomenclature of all plants placed on the officinal list, the Committee have adopted as a standard authority the Prodromus of De Candolle, and have excluded the references now existing in the Pharmacopœia, many of which were found to be incorrectly ascribed, and all of which were deemed unnecessary and superfluous. Chemical substances found in the lists, have attached to them their appropriate symbolic formulæ, as their descriptive phrase, derived from the last edition of Turner's Chemistry, which indeed has been relied on as the standard of authority of all chemical substances and principles contained in the work.

Governed by the principles above detailed, the Committee commenced the revision of the Materia Medica, and after each substance had been called up, examined, amended, or removed, such new substances also being introduced, as in their own opinion or from acknowledged authorities appeared to be needed, the whole subject was referred to a sub-committee of three, carefully to scrutinize, revise and perfect. From this sub-committee the amended list came, with its parts reduced to symmetry, its excesses lopped off, and its deficiencies supplied, and after having again been submitted to the ordeal of the whole Committee, the list now reported as the Standard Officinal List of Materia Medica for the U. S. Pharmacopœia, was adopted.

The list of indigenous and naturalized plants, having been also prepared with equal care, was in like manner adopted.

Reasons are given in the Journal of Amendments for every change and amendment which is proposed.

During the arrangement and preparation of the officinal list, other matters incidental to the general result were discussed and acted upon, and among others, it was resolved that each member of the Committee should provide himself with a copy of the U. S. Pharmacopœia, edit. 1830, and such other books of reference as he could obtain, and produce them at the meetings of the Committee;—consequent upon the passage of this resolution, was the presence at each meeting of several excellent works of reference, and standard authorities. The two lists having been completed, the consideration of other topics, whose position properly introduced them after the lists, was entered upon. These considerations embraced the subject of weights and measures, specific gravity, some general pharmaceutic directions, and a table of brief chemical directions, which should determine, by reagents, the purity of all chemical substances contained in the Pharmacopœia. The consideration of these subjects resulted in the adoption of the existing tables of weights and measures, with a slight amendment as regarded the weights; in the adoption of the terms of Baumé's hydrometer to be employed in common with the ordinary terms of specific gravity to express the density of fluids; and in the dispensing with general pharmaceutic directions, as inconsistent with the nature of a Pharmacopœia. The preparation of the chemical direction, a work of great labor, and requiring an intimate acquaintance with pharmacy and chemistry, no less than untiring industry and perseverance, was confided to a sub-committee of three, the chairman of which, Ambrose Smith, was aided by Thomas H. Powers and John C. Allen. Their labor has but just been completed, having proceeded *pari passu* with the general revision; and subsequent reflection has induced the Committee to assign to the directions a position following the preparations, instead of making them intermediate between that division of the work and the list, as was at first proposed. The value of such a table or digest, it is presumed no one can doubt. It affords a criterion by which the identity

of any chemical substance, included in the Pharmacopœia, whether the result of our own processes or derived from the manufacturer, may be perfectly established ; and as the work falls into the hands of many who, not being adepts in chemical science, are consequently unable to suggest the tests proper to be employed ; to such, its value is inestimable, as at once relieving them from any doubt, and removing any apology, which might otherwise be offered, for dispensing impure or adulterated medicines. It will be observed that the Committee have above specified what they determined to leave undone, as well as that which they thought proper to do. This course is deemed necessary, in order that where no action appears, such deficit may be shown to be the result of deliberation, not of oversight.

Some idea of the amount of amendment which the Materia Medica received, may be formed from the annexed statement showing the number of removals, additions, and alterations, of which that list has been the subject.

The number removed was,	55
" " and placed among preparations,	2
" amended,	82
" of new substances introduced,	65
Total,	204

Of the number removed, fifty-four were taken from the secondary list, and but one from the primary. Of the fifty-four, the greater number found a place in the list of indigenous and naturalized plants. While those unchanged, amounted to one hundred and fifty-two ; showing that more than one-half of the list was entirely remodelled. Beside this statement, confined to the officinal list, there was a new list formed, comprising ninety-eight native or naturalized plants, not thought worthy of the officinal rank, and constituting a distinct list. To collate, correct, modify, and complete the above list, required an amount of labor, which can alone be estimated by those who have participated in the duty.

Previously to the final action of the Committee on the above subjects, they took into consideration, the manner in which they would proceed with the revision of the second grand division of the Pharmacopœia, containing the formulæ for preparations. On the 19th of May, it was resolved that the consideration of the preparations be divided among sub-committees, whose duties shall be to examine carefully the existing formulæ of the Pharmacopœia, which may be referred to each ; to compare the proportions employed, with those directed in other standard Pharmacopœias; to criticize the directions given for preparation; to append to each formula the equivalent of troy weight in equal parts; to recommend the introduction of such new preparations as they may deem necessary; to be careful in the arrangement and terms of new formulæ, in order to preserve the symmetry already existing, as well as in the employment of the nomenclature adopted; to indicate the removal to the Materia Medica list, of such preparations as they may think proper; to consult, such works as are especially regarded as standard; as Turner's Chemistry, London Pharmacopœia, Paris Codex, American Journal of Pharmacy, and Universal Pharmacopœia; and finally to seek the best information from every source, confirming doubtful opinions by experiment, and assigning reasons for every alteration and removal. Every member of the Committee of Revision, being expected to furnish to the sub-committee, of which he is not a member, any information or suggestion, in regard to subjects especially referred, which he might possess. Under this resolution the Committee was divided into three standing sub-committees on the preparations, which were distinguished as No. 1, No. 2 and No. 3.

Com. No. 1 consisted of Messrs. Ellis, Powers, and Smith.
" 2 " " Durand, Moore, and Procter.
" 4 " " Fisher, Allen, and Duhamel.

The above resolution, in its various branches, comprises in a compendious form all the principles by which the Com-

mittee were governed in effecting the revision of the preparations. To enable them systematically to promote the detail, a regular mode of proceeding was devised, and invested with the authority of by-laws for the control of the Committee. These by-laws were as follows:

"In revising preparations, each committee shall be called upon for its report, in its proper turn. The preparations shall then be taken up in alphabetical order, be discussed, amended, and adopted or rejected.

"The introduction of new preparations shall take place after all existing formulæ shall have been considered, when the Committee will decide what new formulæ shall be introduced.

"New formulæ, which may be reported in terms not symmetrical with those of the Pharmacopœia, shall be recommitted to the committee reporting them. The same shall be done with any preparation, not reported, in conformity with the resolution on that subject.

"All reports shall be in writing.

"It shall require at least two-thirds of the whole Committee to alter any amendment, or change any adopted substance after it has passed."

By these self-imposed rules, the Committee was regulated during its action upon this branch of the subject, and the great despatch and convenience which were found to result from the system, thus pre-arranged, fully justified the anticipations which had been formed of its effects. It will be utterly impossible here to show, how far the principles before laid down for the action of the Committee have been carried out, as such a detail would require a minute review, and analysis, of the revised Pharmacopœia, a comparison of all its formulæ, with those not only of our own, but the English and French authorities, and a complete repetition and renewal of the labor through which your Committee has just passed. But while such an analysis, and comparison, and repetition are impracticable, by which the fidelity of the Committee to the established principles, may be proven; they would respectfully again call your attention to the crowd of

specimens which they exhibit, the mass of documents which they present, and submit, whether such results could have grown out of idleness, ignorance, or inattention. Their great aim in the amendment of formulæ, has been to simplify them, to effect their correspondence with enlightened usages, and to render them as perfect as possible. In the introduction of new formulæ, they have been guided by the information derived from foreign authorities of standard value, as well as by the experience of the profession of our own country, as to the wants and usage of our own medical community. No amendment has been adopted without some good reason being proposed; no new formula has been introduced without some cogent necessity for its admission—change or novelty has never been a motive for innovation, nor has any preparation been hastily passed over, without deliberate examination and judgment. The report of each committee as it passed in review, was watched closely, and explanations demanded, or amendments proposed, before its sanction and the adoption of the Committee were awarded to it. Not one report, it is believed, passed this ordeal without some modification from its original shape, and at every meeting some recommitment, or special instruction to a sub-committee took place.

The number of sessions occupied with the consideration of preparations, was nine, during which the following results were produced.

The number	of formulæ	removed were	55
"	"	amended "	159
"	"	introduced "	113
"	"	left unchanged	94

By this statement it will be seen how extensive have been the grounds over which the Committee have passed; how much to the advantage of the Pharmacopœia, is neither for themselves nor for you to say; to determine this is assigned to another tribunal, which, it is believed, will find in the reasons given for every step, sufficient motive to admit the novelties and approve the amendments.

A great improvement, the Committee think has been effected in the introduction of equal parts, appended to each formula. The unequal system of weights existing in our shops, leads to the constant danger of the use of avoirdupois instead of troy weights, and this danger was greatly enhanced by the paucity which existed in the number of troy weights, to be found even in this city, a fact which rendered a nice calculation necessary where a formula was compounded, to convert the sole pile in the shop into its troy equivalent. This inconvenience, and the consequences which must inevitably flow from it, is obviated by the employment of equal parts, which, however determined, must still retain their relative value; and effectually prevent the results which must ensue from the substitution of amounts so entirely dissimilar, as those of the troy and avoirdupois weight, expressed by identical terms.

But perhaps the amendment of most value, independent of special modifications in particular formulæ, has been the introduction of the process of Displacement or vegetable lixiviation, in the preparation of a large class of formulæ, to which the experience of the Committee and others has found it admirably adopted. It was early determined that the use of this process must be adopted, and it became an anxious question with the Committee, to say whether one general description of the process should be prepared, and inserted in the former part of the work, or whether a detailed direction for its execution should follow each formula to which it was applicable. Objections existed to both. To the former mode it was opposed that pharmaceutic directions were inconsistent with a Pharmacopœia, as the Committee had determined by its own vote; to the latter, there existed the inconvenience, monotony and tautology, of directions unwieldly in length, and in an almost identity of terms. The subject having been fully considered, it was finally concluded that an exception to the general rule was admissible in the case of this new process; that it would be depriving the profession of a most valuable agent, and the country of an important

improvement, were the process of displacement withheld from the Pharmacopœia, until a longer period of time had familiarised the whole pharmaceutic community with its details, and thereby rendered so particular a description of it unnecessary; and the subject was referred to a sub-committee, to report a detailed direction of the process of displacement proper to be placed in that portion of the Pharmacopœia which precedes the preparations. This sub-committee, consisting of Messrs. Fisher, Duhamel, and Procter, reported such directions, which, after close scrutiny and amendment, were adopted, which, with the reasons assigned for their adoption, are entered upon the Journal of Amendments. Provided with this general description of the process, the pharmaceutist will be enabled to understand and fulfil the direction "to displace," as he is that "to filter" or to "crystallise." The adoption of this amendment, by the representatives of the National Convention, the Committee most earnestly desire.

The whole work, having thus passed through the hands of the Committee in detail, was referred to a sub-committee, consisting of Elias Durand, Ambrose Smith, and William Procter, Jr., who were instructed to revise the labors of the whole Committee. This sub-committee, immediately upon its appointment, proceeded to an examination of the work, reducing its parts to symmetry, correcting errors of inadvertence, modifying such formulæ as subsequent reflection indicated as requiring improvement, rendering every part consistent with the general design, and giving the last feature which was to be impressed upon its form.

After a careful consideration, the several objects of inquiry, as stated above, were brought before the Committee of Revision in a report which embraced every topic appearing to require a review. In general, a ready concurrence in their recommendations was yielded, and by this means the whole work has been rendered as correct as it has been in the power of the Committee to make it.

The Committee believe they have nothing further to add, in regard to the preparations, and will proceed to complete

their report with one or two miscellaneous topics remaining to be noticed. They have to mention, that at their meeting on the 2d of June they received with regret the resignation of their colleague, Thomas H. Powers, from the Committee of Revision, on account of his inability, from other claims upon his time, to attend to the duties. His resignation was accepted, and a continuance of his attendance at the meetings of the Committee requested. The vacancy occasioned in the Committee of Revision was filled by the election of Joseph C. Turnpenny, from whose counsels and experience the Committee has derived valuable aid. The vacancy in sub-committee No. 1, was supplied by the successor of Mr. Powers, and to that in the committee on chemical directions, the chairman of the Committee of Revision was assigned.

The Committee have now to bring before the College a statement of the expenses which they have found it necessary to incur, amounting to $11.71. In making the outlay, the utmost economy, consistent with a satisfactory discharge of their duties, has been observed, and they trust that their action in this respect will meet the sanction of the College. The particular items for which the expenses have been incurred, are contained in the annexed statement marked—"Expenses."

Although the revision of the Pharmacopœia has been prepared exclusively at the instance of the National Convention, and by a resolution of the College is directed to be referred to the Committee to which other revisions have been referred, yet your Committee think it would be desirable that the Journal of Amendments and specimens, which have been prepared, should, after having been examined and acted upon by that Committee, be returned to the College; the written documents to be placed in the Library, the specimens to be deposited in the Cabinet. The preservation of the documents and specimens, the Committee consider of considerable importance, as affording a reference for our successors, and exhibiting the share which our Institution has contributed toward the formation of the National Pharmacopœia. By asking this return of the Journal of Amendments, it is not pro-

posed that the identical copy, now prepared for reference, should be that which it is proposed to preserve among our archives. On the contrary, the Committee regard the work, as worthy of engrossment in a more durable and elegant form; that the whole may be collected in one volume, with its title and the occasion of its preparation suitably inscribed. This hasty copy prepared with despatch for the service of the Committee of the National Convention, your committee consider not sufficiently dignified and imposing in its exterior, to form the first of the elaborate and finished series of "Revised Pharmacopœias," which they trust is to decorate and enhance the value of our Library. The Committee trust that the resolution which they present in regard to this subject will meet the approbation of the College.

One further topic remains to be offered for your consideration. It has been thought expedient that a committee of the College should be appointed to take charge of the Journal of Amendments and specimens, to convey them to the Committee of the National Convention, and to tender the further cooperation of the College, if a further joint action be needed. A resolution is appended, providing for the appointment of such a representation of our Institution, and awaits your approbation or dissent.

Before concluding, the Committee deem it not irrelevant or out of place to say, that in reviewing the result of their labors, and venturing a glance towards futurity, they could not but be struck with the importance of the consequences which may flow from the combined and harmonious action of the representatives of the two professions, now for the first time acting in open and intimate connection, for the exalted purpose of preparing a code that will insure to the community, through the agency of the medical and pharmaceutical corps, the aid to be derived from every late improvement.

Animated by the most philanthropic motives, each has brought to the task all the light which long and enlightened experience, mature and deliberate observation, ingenious and well-directed research could communicate, illuming and ban-

ishing darkness, raising the veil of obscurity, and dispelling error. Of the share which the profession of pharmacy is capable of contributing toward the amendment and improvement of a National Pharmacopœia, it becomes not us to boast; of the share which those who represent the medical profession will furnish, it becomes not us to judge; each will doubtless devote the best efforts of their professional skill to the undertaking; and an honorable and praiseworthy emulation will be excited in each, to effect, to the utmost of their abilities, the perfection of the great work which they have in charge.

Uninfluenced by prejudice, uncontrolled by partisan views, untrammelled by dogma, and unfettered by a veneration for mere antiquity, the results which must flow from the co-operation and concurrence of sentiment of the two professions, must be vast indeed. They must give a tone and character to the Pharmacopœia of the United States, which will endow it with the freshness and independence of an original work. It will be utterly exempt from the imputation of being derived from foreign authorities by a mere transferrence of the contents of their pages to our own; but, above all, and by far the most important advantage which is to be derived from the mixed commission, under which the revision has been effected, will be to insure uniformity of nomenclature, and identity of preparation, to a greater extent than any influence less than that of positive law, would enforce. For after all it must be borne in mind, that, in this country, it rests with the individual judgment of each apothecary to adopt or reject the formulæ of the Pharmacopœia, as they may meet his approbation, or obtain his confidence by the faith which he may place in the knowledge and capacity of those who may have had charge of their creation. The experience of every one will sustain this declaration. As the latter influence is that which in the main, governs the majority of those who are to employ the preparation, it follows that it is a matter of the last moment so to direct the composition of the board of review, as must effectually and certainly win the reliance of the large class, whose confidence must be secured if uniformity and identity

be indispensable. This can by no means, in our opinion, be so well obtained, as by the means adopted in the revision of the forth-coming edition, inviting the co-operation of our schools of pharmacy. A knowledge that those institutions have participated in the revision—that in all the points of view in which the pharmaceutist regards formulæ, these formulæ, now put forth for observance, have been examined, scrutinized and improved by those who have the interests and progress of pharmacy in charge, will do more to secure for the Pharmacopœia the individual suffrage and support, which ultimately are to approve or condemn. It would by no means be the design of your Committee to assert that the reputation of the work depends on this cause alone, but added to the character which it receives from the knowledge that the formulæ have received the examination and sanction of eminent members of the medical profession, and are, therefore, of such strength and proportions as will be approved in practice, a sure and important confirmation of it will be derived upon the same certainty that pharmaceutists have also shared in its production. Being designed for the use of two professions, it needs that two professions should have concurrent action in its creation. The physician will look to it as the work of a medical man; the apothecary will regard and value it as the work of pharmaceutists. The experience of the period which has elapsed since the publication of the last edition, fully justifies these remarks, and an appeal to the shop note-book and interlineations and comments which most Pharmacopœias contain, will prove beyond question, that improved as the edition of 1830 was over its predecessor, in every respect, there was still room for the information, which the experience of the shop could alone supply. This information the revised edition will contain, and the possession of that experience, the increased reliance which therefore will be felt in the directions of the Pharmacopœia, the consequent general adoption of it, the harmony of nomenclature, and the uniformity of preparation which it will insure, are unhesitatingly pronounced as important and vast, as they have been characterized.

Momentous as they are, and great as the amelioration to society would be, they depend in a great measure upon the value which may be placed upon the amendments emanating from the pharmaceutic institutions of the country, who have long since seen and regretted their inability to amend the defects. Alone, they possessed no other means, than the publication of a Pharmacopœia of their own, as a mode of remedy, which, however readily and heartily it would have been seized upon, would have appeared discourteous to the profession of medicine, would have created an apparent diversity of interests, and prevented the present alliance, fraught with so many causes of congratulation. Long may that alliance continue, and forever banish the necessity of a recourse to the mode of relief above indicated.

From the first steps having been taken by members of the medical profession, in framing a National Pharmacopœia, adapted to the wants of the country, and from no provision having been made by them, by which the profession of pharmacy could be associated with them, no general and material contribution toward the early Pharmacopœia was derived from the College of Pharmacy. The want of this aid was seen and admitted by the last Convention for revising the Pharmacopœia, and as one of the consequences of their action, ultimately has been produced the revised plan, submitted here by your Committee; and which, should it meet your approbation, will show to the medical profession, upon whose invitation we have acted, that naught was needed to induce us to furnish our experience, research, and professional knowledge, cheerfully and at large, but the the assurance that our co-operation was valued and would be appreciated. That a respectfal estimate was placed upon the service which we could render, that our amendments would be regarded as entitled to serious consideration, and that every proposition submitted by us would be received and disposed of solely on its own merits, were fully evinced in the terms and tone of the application from the representatives of the National Convention, addressed not only to our own,

but to the Colleges of Pharmacy in New York and Boston. The excellent feeling thus indicated, has been confirmed by the delay which it is known that Committee has suffered, from the length of time which our revision has occupied, and to which they courteously submitted, that they might avail themselves of our action on the subject. Were further grounds for confidence needed, that amendments emanating from our College would receive impartial and respectful consideration, that its recommendations are addressed to unbiassed, unprejudiced minds, they are to be found in the character of those known to compose the Committee, to which our revision, in common with others, is to be referred, for intelligence, ability, professional knowledge, candour, and conscientious discharge of duty; to which may be added an identity in feeling with ourselves for the prosperity and honor of the Philadelphia College of Pharmacy.

The course which we may anticipate the Committee of reference thus characterized will pursue, will for ever remove any occasion for our separate and distinct action, for ever avert disunited and adverse councils between professions, whose ties are so intimate and close. But your Committee forbear further remark, having far exceeded the limits assigned at the outset, and pass to the last portion of their report.

The Committee of Revision part from their production and commit it to your hands, invoking your sanction for it, and the adoption of it as your own work. A feeling of melancholy pleasure attends this completion of their duty, while a lively feeling of satisfaction is excited at having reached the goal after a long though not tedious journey. Entirely inexperienced in the detail of revision, unguided by any precedent, by which their steps might be directed, the Committee commenced the task, pioneers in a great undertaking. Vast as was regarded the ground to be passed over, distant as appeared the terminous, and obstructed as their rout seemed to be, when viewed from its remote extremity, it was found to be capable of being traversed without difficulty, and to be unembarrassed

with the obstructions, which at first lowered on the view. Encouraging and aiding each other by counsel and support, by mutual concession and deference, the meetings of the Committee have been characterised with good feeling, confidence, and unanimity. No fixed adherence to predetermined views has ever marred the councils and prevented a general concurrence in the opinions and decisions of the Committee. Those who constituted the Committee have now no longer in prospect the pleasures of future deliberations and discussion, and it is thought important that you should be apprised that they part from each other with the most pleasant reminiscences of the many hours which they passed together in delightful intercourse, and that all will look with the most agreeable recollections to the good feeling and harmony which prevailed: creating intimacies, establishing confidence, and inviting regard, by developing the professional abilities, as well as social characteristics of their colleagues. For the many pleasures derived from this association, for the high trust deposited in their hands, and for the patient attention which their lengthened recital has received, they have to offer their acknowledgements to you, their constituents; and here resigning their trust, to ask at your hands, a discharge from further service.

All of which is respectfully submitted by

Wm. R. Fisher,
E. Durand,
Charles Ellis,
Wm. W. Moore,
Jos. C. Turnpenny,
John C. Allen.

Philadelphia, Nov., 1840.

Whereas, The Committee of Revision, appointed on the 30th of March last, has reported to this body an amended copy of the United States Pharmacopœia, prepared in accordance with the provisions and instructions contained in the

resolution under which they were appointed; and whereas the Philadelphia College of Pharmacy has assented to the invitation to co-operate with the Committee of the National Convention, and has accordingly caused the aforesaid revision to be effected through the agency of its Committee; and whereas, the revised edition which the Committee present, has been the result of great labor, extended research, and is eminently worthy of preservation in a durable and appropriate form ; and whereas, the specimens exhibiting the results of improved formulæ, are also of value and entitled to preservation; and whereas, it has been found necessary that some expenses should be incurred by the Committee of Revision for the proper discharge of their duty; and whereas, the Committee upon submitting their report, ask their discharge,

Therefore, be it *Resolved,* That this College adopt the revision of the U. S. Pharmacopœia, prepared by its Committee, as its own act, and sanction the proposal of the amendments therein contained.

Resolved, That a committee of three be appointed to convey, in behalf of this College, to the Committee of the National Convention, the Journal of Amendments, and accompanying specimens illustrative of the result of amended formulæ, and also tender to the said Committee the further co-operation of the College, should such action be needed.

Resolved, That the College will regard said Journal of Amendments and specimens as its own property, and will expect their return so soon as the purpose for which they were prepared has been accomplished, and that the Secretary of the College be directed to procure an engrossed copy in one volume, properly entitled and labelled, and durably and handsomely bound, of the two Journals reported by the Committee of Revision, to be deposited in the library of the College. The specimens when returned to be placed in the cabinet.

Resolved, That dollars be appropriated to defray the expenses incurred by the Committee of Revision for the purposes indicated in the statement submitted by them.

Resolved, That the Committee of Revision be discharged from the further consideration of the subject.

Adopted.

List of Documents accompanying the Report.

1. Circular to Members and Graduates.
2. Correspondence.
3. Resignation of Thos. H. Powers.
4. Reports of Committees (miscellaneous.)
5. Reports of Committees on Materia Medica, preparatory to the completion of the list.
6. Complete Report of Committee on Materia Medica.
7. Plan of arrangement and Report on Displacement.
8. Reports of the Standing Committees on Preparations.
9. Report on Chemical Directions.
10. Report of Sub-committee of Revision.
11. Minutes of Proceedings, 1 vol.
12. Journal of Amendments, 2 vols.
13. Index to Journal of Amendments, 1 vol.

ART. LVI.—PHARMACEUTICAL NOTICES. No XXI.

By Augustine Duhamel.

Consolidation of Copaiba by Wax.

The once common method of consolidating copaiba by means of calcined magnesia, has in a great measure given way to another and more convenient form of administration, under the well known name of capsules. The advantages of these last over the other, as regards convenience and nicety of administration, added to the certainty of ensuring the effects of pure copaiba, are so well-understood and appreciated, as to render it a work of supererogation to repeat them here. With reference to the solidification of copaiba, it should be borne in mind that it is only under peculiar conditions that it will take place—for instance, the magnesia must be pure, and the copiaba old, having undergone a certain degree of inspissation. If fresh, and consequently rich in essential oil, a large quantity of magnesia is required to solidify it—and even then only at the expiration of a long period. A mass which we made more than six months ago, with as much as one-fourth of magnesia, is not yet sufficiently hard to retain the form of pill. If to obviate this, you subject it to heat or employ inspissated copaiba of a certain consistence, you readily obtain a solidified mass; but which, owing to its hardness and insolubility in the stomach, is as inefficient a remedy for the purposes intended, as ordinary resin would be, prescribed for similar uses. The only useful purpose to which we have been able to apply the soft or half-solidified mass has been to incorporate it with powdered cubebs, and thus prepare a compound pill of copaiba and cubebs. It requires, however, a very large proportion of the latter, to form with it a good pilullar mass.

A better method is one, the idea of which is taken from a prescription of Dr. Berens, a German physician, now practising in this city. It is to disolve by heat a certain portion of white

wax in the copaiba, and then incorporate with it the powdered cubebs. When cool, the mass will have acquired sufficient firmness to be divided into pills. Here is the doctor's prescription—

℞. Ceræ alb. ʒij.
Leni calore liquefactæ et semirefrigerata adde agitando,
Balsam. Copaiv. ℥ss.
Pulv. Cubebar. ℥j.
M. Fiant pilul. No. 240, consperg. pulv. lycopod.

These cerated pills of copaiba, are of good consistence and do not become hard like the other. Apothecaries should suggest this method to physicians, who are often at a loss when wishing to prescribe copaiba in the form of pills combined with other remedies to suit an emergency.

The good effects of this remedy in the case of delicate patients were in the majority of instances rendered unavailing, by reason of the disgust uniformly exhibited towards the taste of copaiba, until the capsules were introduced. These, however, do not admit of physicians prescribing copaiba united with other substances, as the empty capsules of gelatine are not to be obtained. Under these circumstances, the idea thrown out by the above prescription, may be worthy of some consideration.

Cicuta Plaster.

This plaster is not officinal in the London, Dublin, Edinburg, or U. S. Pharmacopœias, though as respects the latter, it will probably become so in the forthcoming edition of that work. The following proportions taken from the Prussian Pharmacopœia, are such as may be employed with excellent results—

Yellow wax	2 oz. or 2 parts,
Resin	1 oz. or 1 part,
Olive oil	1 oz. or 1 "
Powdered cicuta leaves	2 oz. or 2 parts.

Melt the wax and resin in the olive oil over a gentle heat, (warm ashes,) after which strain and add the powdered leaves, stirring at the same time with a spatula, that the cicuta may be well incorporated. When cold, form the mass into rolls.

It is officinal in the French Codex; according to which, the fresh cicuta leaves are boiled for some time in the oil, then strained, and the other ingredients afterwards added. When good cicuta leaves cannot be obtained, half the proportion of well prepared extract will answer an equally good, if not better purpose.

Adulteration of Cantharides.

Though we are enjoined not to purchase cantharides in a pulverised state for fear of adulteration, it behoves us to examine such parcels as we may wish to purchase in the entire state, for a similar reason. Besides, the inert *Melolontha vitis* sometimes mixed with the genuine flies, we have met with a new subject of adulteration, not so nearly allied to the *Cantharis* in entomological classification, which were, however, pretty freely interspersed with them in a lot which we purchased without examination.

It is the *Cetonia*, vulgarly called Goldsmith, the shining golden green color of which resembles cantharides, and is calculated to deceive when mixed together, unless they undergo inspection. As they are large, and much heavier than the Spanish fly, it makes quite an object to a dealer, in the sale of a large quantity.

Fluid Extract of Senna.

In vol. 6th, page 274th of this Journal, will be found a recipe for this preparation, by Charles Ellis, who first introduced it to public notice. The attention of some of our physicians having been lately awakened to its convenience of administration, and finding it a certain and active preparation, far surpassing the infusion or confection of senna in point of general utility, we have had occasion to prepare it in considerable quantity to answer the demand. The improve-

ments made in Pharmacy since the publication of Mr. Ellis's formula have caused us to differ somewhat from the method of preparation as laid down by him, which, without additional, and even less trouble ensures a manifest advantage in the quality of the medicine. We have likewise at the suggestion of several medical gentleman, carried it to a higher degree of concentration, so that, as made by us, one ounce of the fluid extract represents ℥j. of senna in substance, and consequently a table spoonful constitutes a good purgative dose.

By the method here given it is made in thirty-six hours—in the former way, twelve days is the allotted time for completion.

Take of Senna leaves coarsely powdered, or bruised in a mortar,	32 oz. or 32 parts,
Diluted alcohol 16° Cartier (one-third rect. alcohol, two-thirds water,)	4 pts. or 64 "
Water,	1 gal. or 128 "
Sugar	20 oz. or 20 "
Oil of fennel,	64 drops,
Hoffman's Anodyne,	q. s.

Mix the senna in a covered vessel with the alcoholic menstruum, and allow the mixture to stand over night. In the morning of the ensuing day put it into a Boullay filter and operate by displacement with the remaining aqueous menstruum until 1½ gallons of liquid has passed. Then evaporate by a gentle heat to twenty fluid ounces, and, while yet hot, add the sugar that it may be dissolved. Strain to separate the mucilaginous matters coagulated by the heat, and when cold add the oil of fennel in the proportion of two drops to each ounce of extract, disolved in a small quantity of Hoffman's anodyne. This last, besides serving the purpose of a solvent for the oil, prevents fermentation. The griping properties are in a great measure, if not wholly, prevented by the addition of the oil of fennel.

ART. LVII.—PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.

I. Report of the Committee appointed at a public meeting of Chemists and Druggists, held at the Crown and Anchor Tavern, Strand, on the 15*th of February last.*

II. Address of the Council of the Pharmaceutical Society to the Chemists and Druggists of Great Britain.

III. Constitution and Laws of the Pharmaceutical Society of Great Britain.

IV. Pharmaceutical Transactions, Edited by Jacob Bell, Nos. 1 *to* 4, *for July, August, September, and October,* 1841. *London, J. Churchill, &c.*

There appears, to a stranger at least, much confusion in the ranks of the medical and pharmaceutical communities in Great Britain. The English "Apothecary," so called, is properly a dispensing Physician. With those amongst them who deal in drugs at all, medical practice is the principal object, selling and dispensing medicines a secondary one.

The medical practice of the "apothecary," which, perhaps, was in its origin induced by the exclusive laws, which hedged around the entrance to the professions of the physician and surgeon, was long considered irregular, and their charges were not for advice and attendance given, but for medicines furnished to their patients.

This amalgamation of the duties of physician and druggist, seems to have had an injurious effect upon their standing in the community; the divided nature of their duties, disqualified them from rising to eminence, either as pharmacians, or practitioners, while their interference in medical practice, naturally awakened the jealousy, and provoked the opposition of the physicians. The opposition thus occasioned, tended to produce a closer union among the apothecaries themselves; and the accusation, constantly directed against them of selling bad medicines, gave an excellent pretext for the formation of

a joint stock company, and the establishment of a laboratory at their Hall, for their own use, and for supplying their members with drugs. The attention paid by them to the practice of medicine, naturally led to a neglect of pharmaceutical operations, and this circumstance, aided by the efforts of the physician, had the effect of bringing forward, in a more prominent manner, the retail chemist and druggist, or that portion of the apothecaries who abstained from medical practice. In 1732, the larger portion of the practice of the kingdom having fallen into their hands, the Legislature constituted the apothecaries, who now regularly studied physic, a medical body. By another act of parliament, passed more recently, (1813,) it is directed that twelve persons should be appointed by the Society of Apothecaries, to "ascertain the skill and abilities of such person or persons, (applying for certificates to practice as apothecaries,) in the *Science and Practice of Medicine*, and his or their fitness to *practice* as an apothecary, and they are empowered either to reject such person or grant a certificate of his qualification." None to be allowed, but to such as are twenty-one years old, who have served an apprenticeship of at least five years to an apothecary, and who shall produce testimonials of a sufficient medical education. The act also contains directions with respect to their preparing and dispensing medicines, imposing certain penalties upon them, in case they refuse to prepare, or unfaithfully compound the prescriptions of physicians. Thus it will be seen, that the law, fully recognizing them as practitioners of physic, considers them, also, as dispensers of medicine. They appear, however, to be generally dropping the pharmaceutical portion of their duties; many of them, indeed, now call themselves "General Practitioners," discarding the title of apothecary, which of right belongs to the retail chemist and druggist, whose establishment is the true ἀποθηκη.*

* τιθημι (to put or place,) 'ἀπο (from, or away,) whence the noun 'ἀποθηκη (apotheca) a repository, and the modern Latin word *apothecarius*, a keeper of a repository of things laid up for special uses.

That the separation between the two professions should be as complete and wide as possible, is no doubt demanded by the true interest of both.

The chemist and druggist has hitherto been free from any special legislative enactment; but an attempt has recently been made to pass an act, (known as "Mr. Hawes' bill,") through parliament, to bring them under legislative control and prohibit them, under penalties, from prescribing at their counters. Although the more respectable among them avoid, as much as possible, giving medical advice in any way, they contend that severe legislative restrictions would be attended with injustice, or at best be ineffectual. That it is in fact a part of their duties, to be conversant with the doses and properties of medicine, and to communicate that knowledge when called upon; that it would be unjust to punish the druggist for doing that which every vender of merchandise is allowed to do, explain the uses and describe the properties of the article in which he deals. That if giving advice in simple cases, is to be made a felony, few benevolent individuals, and no old women in the kingdom, would be safe from fine and imprisonment; and that equity requires, if the chemist and druggist is, by law, to be excluded from the practice of the apothecary, the apothecary in like manner should be forbidden to interfere in the province of the druggist, by the sale of medicine.

The efforts of the chemists and druggists to prevent the passage of this bill, by bringing them in contact with each other, for the purpose of united defence, has taught them the necessity of association, for the protection of their interests as a community, and has generated a degree of esprit du corps, in which feeling, they appear to have been hitherto remarkably deficient. The advantage found to result from the partial union thus produced, together with a general conviction of the necessity of some authorized supervision, caused the germ of the "Pharmaceutical Society of Great Britain," of which the papers cited at the head of this article, contain the initiatory reports, &c., together with the earlier numbers of a

monthly journal, instituted to advocate its formation, and publish its proceedings. The first is a report from a committee, consisting of the leading London chemists and druggists, of which Joseph Gifford was chairman, to a general meeting of the trade, recommending their organization as a professional body, and the establishment of an institution to promote the improvement of pharmacy, and maintain the interests of the chemists and druggists of Great Britain.

After detailing their successful opposition to Mr. Hawes' bill, the committee say :

"In the progress of their proceedings your Committee ascertained that the College of Physicians, the College of Surgeons, and the Apothecaries' Company had conjointly proposed obtaining some legislative enactment, by which the chemists and druggists were to be, for the future, placed under the government and control of these learned bodies, more especially of the Society of Apothecaries.

A deputation from your Committee, therefore, sought and obtained an interview with the College of Physicians and the College of Surgeons, respectively, and received from the former an official notification that it was their intention to introduce into their proposed measure of medical reform, a provision by which the chemists and druggists should thenceforth be placed under some legislative control; and your Committee have, therefore, again assembled you for the purpose of receiving new instructions and enlarged powers to meet present and future circumstances.

Your Committee having considered the subject, are of opinion that the chemists and druggists are capable of self-government; they, therefore, recommend that the chemists and druggists of the Empire should immediately form themselves into a permanent Association, to be denominated the "Pharmaceutical Society of Great Britain," having for its object the union of the members of the trade into one body—the protection of the general interests—and the improvement and advancement of scientific knowledge. As the basis of such union, your Committee would recommend the adoption of Education, Examination, Registration, and Representation as involving beneficial results to the Public in general, and to the chemists and druggists in particular; and offering to the existing medical corporations, and to the medical profession at large, a guarantee, that whilst the chemists and druggists are anxious to retain their present privileges, they are disposed to afford every public evidence of their fitness to exercise them."

The proposition of the Committee was adopted, and the meeting forthwith organized themselves into a Society, of

which the Committee were appointed the first Council, of which Wm. C. Allen, F. R. S. is President, Charles James Payne, Vice President, Richard Hotham Pigeon, Treasurer, R. A. Farmar and G. W. Smith, Secretaries.

The Council commenced their efforts by issuing an Address to the Chemists and Druggists of Great Britain, soliciting their co-operation and support. A portion of the address we subjoin, which will show the views with which they entered upon their labors.

"Chemists and druggists have long had reason to regret the want of a union of their influence for mutual benefit and protection, and of a uniform education and internal government among themselves, as a means of substantiating their claim to public confidence; being conscious that as long as these defects exist, they may expect to be assailed by obnoxious imputations on the part of those medical reformers who are endeavoring to enforce a system of extraneous restrictions and supervision.

If 'the trade' is to be protected merely *as a trade*, and Acts of Parliament professedly designed for its reformation are to be opposed solely on the ground of self-interest, the task of self-defence will be endless and probably unsuccessful, while the exertions wasted on such struggles can reflect no credit on the spirit or integrity of those who are thus engaged; but if, aware that some regulations may be required, we endeavor to supply the deficiency, which is urged as a pretext for hostile proceedings, we shall secure ourselves against the possibility of persecution.

The importance which chemists and druggists have obtained as a branch of the Medical Profession, the reputation which many among them have acquired individually in their own department, andthe great accession of numbers which now swells their ranks, *demand* the establishment of some judicious regulations which shall place them in a safe and creditable position as *a body*.

Those among us who take a real interest in our scientific art, rejoice at the opportunity which is now afforded of placing the 'trade' of a chemist and druggist on a professional footing, and effecting a union of our scattered forces for mutual benefit and advancement. By these means, talents, which have hitherto lain dormant, will be excited into action, a harmonious intercourse will take the place of reciprocal jealousy and distrust, and all the collective influence we possess will become available in attaining the desired improvement among ourselves, and resisting encroachments or interference on the part of others.

The Council are particularly desirous of overcoming the impression, that a voluntary society cannot effect these objects. They consider that

it will, in the first place, concentrate their power of self-defence, and be the means of distinguishing those who aspire to a high standard of qualification from the careless and indifferent; and, secondly, that by introducing a system of government conducive to the welfare of the public, it will form a basis for any legislative measures which may hereafter be adopted."

They drew up a Constitution and body of laws for the government of the Society, which were adopted at a subsequent general meeting, of which we give the principal features.

"The Members of the Society shall consist of,

1. Chemists and druggists who are, or have been established on their own account, and who shall severally subscribe the sum of two guineas annually.

2. Confidential Superintendents, who shall be elected by the Council, and who shall severally subscribe the sum of two guineas annually.

(*The sum of twenty guineas, subscribed in one payment, shall be received in lieu of the annual subscription.*)

Honorary and Corresponding Members, comprising such medical and scientific men as have distinguished themselves in any of the branches of knowledge embraced in the educational objects of the Society, shall be elected by the Council, but shall not be allowed to be present at any general meeting.

ASSOCIATES.

Assistants shall be admitted as associates who shall pay the sum of one guinea annually; and shall be entitled to all the benefits of the Society, excepting the right to be present at any of the general meetings, or to hold any office in the Society.

APPRENTICES.

Apprentices who shall be duly registered, and who shall pay the sum of one guinea annually, shall have the privileges of Associates.

EDUCATION AND EXAMINATION.

The educational objects of the Society shall embrace the following subjects:—An Elementary Classical Education—Medical Botany—Chemistry—Materia Medica—and Pharmacy.

After the 1st of July, 1842, no person shall be admitted as a Member, or Associate of the Society, without having passed an examination in the above branches of knowledge; and after that period no Apprentice shall be entitled to the privileges of an Associate without having, before the

execution of his Indentures, passed an examination in Classical Education. The said examinations and the registration of indentures shall be subject to the payment of such fees, and the granting of such certificates, as the Council may, from time to time, determine. But all present Assistants and Apprentices, who shall be registered before the above date, shall be exempted from the above restrictions, and shall be eligible as original Members, when they shall have commenced business on their own account.

It shall also be in the power and discretion of the Council to admit as Members, without Examination, after the above period (upon the payment of an entrance fee) such chemists and druggists as have been actually in business on their own account, prior to the above date, but who may have neglected to become Members."

The government of the Society to be vested in a Council, elected at the general meeting of the Society which is to be held annually. There is also a benevolent fund to be provided by specific subscription. From the Report of the Committee appointed to draw up the Constitution, we make the following extracts.

"The influence which chemists and druggists possess as a body when their efforts are combined, has been demonstrated in a manner which affords every encouragement to perseverance. It is equally manifest that if they relax in their exertions, or allow any minor consideration to interfere with the zealous and harmonious performance of the duty which they owe to themselves, they will inevitably sacrifice their independence, and be deprived of many of their existing privileges, by becoming subject to extraneous jurisdiction. It must be recollected that the Society is of a public nature, and involves the prosperity of chemists and druggists as a body throughout the kingdom. It is only by the combined and continued efforts of individuals that a scheme so comprehensive and laborious can be effected; and these efforts to be successful, must be supported by all those who are interested in its accomplishment."

"To chemists and druggists now established, this Society offers the means of extending Pharmaceutical knowledge by the establishment of a recognized medium through which discoveries and improvements may be promulgated; whilst the institution of a School of Pharmacy—the developement of scientific acquirements, and the exhibition of existing talent, will tend to confirm the confidence of the public, and remove our apparent deficiency as Pharmacopolists, when compared with other nations."

"The establishment of an examination in the Classics, for all future

Apprentices, will ensure the possession of that preliminary education which is essentially necessary for the creditable performance of their duties, and their ultimate success as Pharmaceutists; and the increased importance and respectability which will be conferred upon Pharmacy by means of the Society, will induce many of the more wealthy classes to devote themselves to its pursuit."

"The Committee have the satisfaction of stating that a communication has been received from Paris, intimating a desire, on the part of some of the leading members of the Society of Pharmacy in that city, to establish a scientific correspondence with 'The Pharmaceutical Society of Great Britain;' an overture of a similar character has been made on behalf of the College of Pharmacy in Philadelphia. The chemists and druggists of Scotland and Ireland have also expressed considerable interest in the undertaking.

"Your Committee, therefore, congratulate you on the circumstance, that, although the chemists and druggists of Great Britain united in the first instance merely for the purpose of self-defence, in support of their acknowedged rights, that union has resulted in the creation of a National Institution for the advancement of Pharmacy, which will be enabled to carry on a correspondence with similar institutions throughout the world."

A regard for brevity compels us to omit some portions of these reports which we would be glad to extract, but we believe we have given enough to show, that the Institution is commencing with a fair prospect of being sustained with much zeal and energy.

One of the means which the Society has adopted for the advancement of the scientific interests of the profession is the institution of stated "pharmaceutic meetings," at which papers are read and subjects discussed connected with pharmacy. Among these papers are "Observations on the Constitution of the Pharmaceutical Society of Great Britain," by Jacob Bell; "Sketch of the rise and progress of Pharmacy," by Mr. Morson, of both of which we have availed ourselves in compiling this notice; "On the preparation of Iodide of Iron," by Dr. A. T. Thompson; "On Vegetable Extracts," by Mr. Morson; "Decoctions and Infusions," by Mr. Bell; "Displacement," by Mr. Deane; "Vesicating Applications," by Mr. Redwood; "Diabetic Urine," by Joseph Smith;

"Marsh's Instrument," by Dr. Thomson; "Expressed Juices," by Mr. Squire; "Ung Hydr. Nitratis," by Robert Alsop, &c. Some of these papers will be found in a subsequent portion of this Journal, and of others we shall give abstracts.

That an organization of the pharmaceutical profession has not been before effected in England, or at least in London, is to us a matter of much surprise, and to this may, in some degree at least, be attributed the undeniable fact, that in the cultivation of pharmacy as a science, the pharmaceutists of Great Britain are much behind their neighbors on the continent. In pharmaceutic chemistry [and organic analysis, the science of France and Germany is far in advance of England, because pharmacy in the latter country is scarcely cultivated as a scientific profession.

We trust that in the energy, judgment, and professional spirit which is thus far displayed by the Council and active members of the new Pharmaceutical Society, we see the dawn of a more brilliant epoch, when the pharmacian of Great Britain will take that rank in the scientific world, which the eminence of his countrymen in almost every other pursuit, justify us in expecting him to attain.

If the true estimate of the capabilities and respectability of his own profession was duly held, there would be less disposition to step out of his own ranks, and interfere in medical practice. There is ample room in the field of pharmaceutic research, to give scope to the most active and comprehensive intellect; renown enough yet to be acquired, to gratify any properly regulated ambition. Any thing which looks like trenching upon the province of the physician should be discountenanced, and a proper spirit of independence and self respect cultivated. The time has passed, for the one profession to be considered as subservient to the other; where mutual assistance is required, mutual respect is due.

Not the least gratifying evidence of the spirit with which the active members of the association have entered into the cause, is the establishment of the monthly Scientific Journal,

before referred to, bearing the title of "Pharmaceutical Transactions," of which we have the first four numbers before us. It is edited by Jacob Bell, an active and able member of the Council, and published for the present by him, on his own responsibility, as an experiment; although it is, no doubt, to be considered as the organ of the Society, and will be officially adopted as such, when the Institution becomes fully organized. It contains the proceedings of the Society, the papers read at the Scientific meetings, pharmaceutic and general scientific intelligence, &c. We observed in it extracts from our own Journal, and in return present in the present number selections from it, and as its only collaborateur, in the same language, we heartily bid it welcome. Such a journal has long been wanted in England; we trust that it will be efficiently and cordially sustained.

A. S.

ART. LVIII.—OBSERVATIONS ON BLISTERING PLASTER.

By William Procter, jr.

The importance of having this preparation of such decided activity, that it can be depended upon, particularly in extreme cases, can readily be appreciated by medical men. That the continuance of life sometimes hangs on the efficiency of this agent, will be hardly disputed, and any addition to its power should certainly claim the consideration of the physician, who has the interest of his patient at heart; and of the pharmaceutist who is jealous of his good reputation.

Having occasionally had blistering plasters to fail in producing vesication, notwithstanding the cantharides which entered into their composition were of good quality; and having experienced the mortification of hearing a report of their failure from the patient or his physician, the writer, after some experiments on this subject is led to believe that blistering plaster, made from good flies, often fails in producing its peculiar effects, owing to the manner in which the preparation is made and applied.

The first point to be attained, is, in all cases, the possession of Cantharides of known excellence, very finely divided.

The next is presenting them in a vehicle which will readily hold their active principle in solution, and which, when applied to a surface, will be active at every part in contact with it; at the same time that it will retain consistence enough to prevent it from spreading when heated by the skin.

And lastly, it is of great importance that the material employed on which to spread the plaster, be of such a character as not to absorb the fluid part of the cerate, and thus deprive it of its adhesive power as well as much of its activity.

An error which has been generally countenanced by writers on this subject, is that flies are liable to be injured by the heat

of the melted ingredients at the temperature that they usually are when removed from the fire. On the contrary, it is highly probable that a cerate made by adding the flies, just when the other substances are removed from the fire, would be more active, than one made by adding them after the melted ingredients begin to thicken.

Cantharidin, as stated by Thenard (Traite de Chimie, &c., tome iv. p. 592,) fuses at 210° C., (410° F.) and heated more strongly, it is *sublimed* in brilliant needles, but a small part being decomposed.

To ascertain if it was really true that oil at the high temperature above stated, exercised no injurious effect on the active principle of Cantharides, a solution composed of one part of Cantharidin to 100 parts of olive oil was heated until the oil began to vaporize. A portion of this solution, after cooling, was applied to the writer's arm, and in eight hours the surface to which it had been applied was in a state of vesication. Thinking that possibly the matter associated with Cantharidin in the flies might exercise an injurious influence on that principle, when exposed together to a high temperature, a portion of the cerate was heated to 325° Fahr., when its whole surface was in a state of ebullition, extricating offensive vapors, which were probably some substonce in the fly, volatile at that heat. It was then suffered to cool, and a portion applied as before, to the writer's arm for *three hours*, when partial vesication had taken place, followed in a few hours by a copious secretion of serum. Was any further evidence necessary, the preparation called "decoction of Cantharides," made by subjecting the Cantharides in powder to long continued heat in oil of turpentine, at a temperature considerably above that of boiling water, might be adduced.

It is hardly probable that under any ordinary circumstances, the vehicle would be heated as high as 300° Fahr., and consequently the active matter of the flies would remain uninjured.

The fluidity of the vehicle for the application of Cantharides is a subject of much importance, as on it depends in a great

measure, their effects. Hog's lard is frequently employed, and in many respects it is an excellent material. Its fusing point is about that of the temperature of the human body; it is economical, and when olive oil cannot be obtained, it is a proper substitute.

Olive oil possesses all the requisites, and is the correct menstruum.

Oil of turpentine, so far as regards its being a good solvent for Cantharidin, is very suitable, and makes an active preparation, as has been ascertained by experiment, but its volatility precludes its use *per se* in this preparation, because it gradually evaporates and leaves the cerate too stiff. The sequel will demonstrate that a combination of the two last substances, affords the most eligible menstruum for extracting the activity of Cantharides, as relates to the preparation under consideration.

The following formula is proposed, and the numerous instances, in which the activity of the Cerate which it yields, has been tested, gives confidence to the writer in thus making it public—

Take of Cantharides in fine powder,	℥vj.
Olive oil,	℥vj.
Oil of turpentine,	℥iij.
Yellow wax, Resin, of each,	℥iv.

Mix the Cantharides with the olive oil and oil of turpentine in a suitable vessel, place the mixture on a water bath, and continue the heat until the turpentine has nearly all evaporated, which requires six or eight hours, and stir it occasionally during that period. Then add the wax and resin, previously melted together; and continue the heat until they are thoroughly incorporated, and finally remove the vessel from the bath and stir them constantly until cool.

The object of adding the oil of turpentine is to increase the quantity of the vehicle, and thus sooner and more effectually to dissolve the Cantharidin; and its volatility affords a

ready means of getting rid of it after it has performed that function. The proportion of olive oil is rather greater than in the Pharmacopœia, but it is believed to be properly increased.

Vesication, has been produced in several instances in two hours, and from that to six has been the period found necessary for its complete action.

Since writing the above, my attention has been turned to some observations on Cantharides by Joseph Scattergood, (Jour. Phil. Col. Pharm., vol. iii. p. 212,) which go to confirm the above conclusions respecting the action of heat on Cantharides. He proposes an ointment made by decocting blistering flies in olive oil, straining and then adding sufficient wax to render it of the proper consistence. This preparation, though an elegant one, would be weaker than that now proposed; and besides, by removing the flies more space is left for the ill effects of careless manipulation.

Notwithstanding various substitutes for cerate of Cantharides have been proposed, such as a decoction in olive oil, a solution in acetic acid, &c., yet it is hardly probable that that preparation will be superseded, and hence the importance of improving it.

The attention of pharmaceutists has hardly been sufficiently attracted toward the influence of the material upon which the cerate is spread. The article usually employed is sheep skin, which, from its porous character, absorbs much of the vehicle, and sometimes leaves the surface of the plaster so dry as to prevent its adherence and activity. The material should, therefore, be soft and yielding, at the same time that it should not absorb the oil from the cerate. Oiled silk, which possesses all these requisites, is now proposed as a substitute for sheep skin. The small difference in the cost of the two should not counterbalance the employment of the former, when accompanied by such great advantages.

ART. LIX.—ON VESICATING APPLICATIONS.

By Mr. Redwood.

Read before the Pharmaceutical Society of London.

The estimation in which blisters are held as therapeutic agents, and the objections which are urged against those in general use, seem to claim our attention to this class of remedies, with the view of establishing principles upon which their preparation may be improved.

The London Pharmacopœia contains two formulæ for vesicating applications, under the denominations of "Emplastrum Cantharidis," and "Acetum Cantharidis;" and the former of these has for many years been adopted by the Colleges of Edinburg and Dublin, as well as by the London College, and constitutes the officinal blistering plaster of the shops. This plaster requires to be applied for about twelve hours, in ordinary cases, before the full effect is produced, and in many instances a still longer application than this is necessary. To meet the objection which this delay would sometimes offer, recourse has been had to more active and speedy means of producing the same effect. The Acetum Cantharidis is intended as an agent for this purpose, and the Emplastrum Cantharidis Compositum of the Edinburg College will come under the same class.

These are the vesicating applications ordered in our Pharmacopœias, but others are sometimes resorted to in practice. Boiling water offers a ready means of raising an instantaneous blister, which is adopted by some practitioners; and strong acetic acid and solution of ammonia have also been used with the same view. Mustard seeds, applied in the form of poultice, possess powerful epispastic properties, as do also the essential oil of black mustard seeds, and the oil of croton tiglium; and these, together with numerous other acrid vegetable substances, have at different periods been employed, either alone or in

combination. The Emplastrum Epispasticum of the London Pharmacopœia of 1668, contained no less than fourteen ingredients, among which were mustard, euphorbium, long pepper, stavesacre, pyrethrium, cantharides, gum ammoniacum galbanum, bdellium, and sagapenum, with turpentine, resin, &c. The greater part of these ingredients, however, have long been discarded in applications of this description; and, although the Edinburg College still order turpentine burgundy pitch, acetate of copper, mustard seeds, and black pepper, in addition to the Cantharides, in their Emplastrum Cantharidis Compositum, the advantage of such heterogeneous mixtures may be doubted. Indeed, the remark of Dr. A. T. Thomson with regard to this latter preparation, that "its operation is accompanied with very great pain, and a pungent sense of heat," and "is apt to cause very unpleasant ulceration if allowed to remain too long applied," would seem to sufficiently indicate the propriety of finding a substitute for so violent a remedy.

Messrs. Pugh and Plews, of Edinburgh, several years ago, introduced a preparation, under the name of Chemical Blistering Fluid, which they recommended as a substitute for the common blistering plasters. They describe it as producing its full effect in three hours, and say, "it is found also that the burning heat, great thirst, general irritation, strangury, and other unpleasant effects, so frequently attendant upon the application of the old blistering plaster, are avoided by the use of the Chemical Blistering Fluid. It is not only easier and cleanlier in its application, milder, and more efficacious in its action, than the fly blister, but the skin, after its use, is much more easily healed; and it may be reduced in strength so as to render it applicable to the tender skin of infants, which the old blister cannot be."

This preparation appears to be similar to the Acetum Cantharidis of our last Pharmacopœia, which is described by Dr. A. T. Thomson, as intended "for raising a sudden blister." The formula of the London College is, two ounces of powdered Cantharides to one pint of acetic acid, macerated for eight days and strained. It is generally directed to be used, by

applying to the skin a piece of lint wetted with the fluid, and covering this with adhesive plaster. I have found the blistering fluid of Messrs. Pugh and Plews to be of the same strength as the Acetum Cantharidis of the College. The specific gravity and saturating power of the samples tried were as follows;

		SP. GR.		GRAINS
Blistering Fluid	(Pugh and Plews)	1.060	carb. soda required to saturate 100 grains	71
Acet. Canthar.	(Bell and Co.)	1.061	"	72
Ditto	(Herring Brothers)	1.060	"	71

But this liquid blister, while it may possess advantages in some respects, yet is frequently complained of, as uncertain and sometimes ineffectual in its operation. The Acetum Cantharidis, prepared by houses of the highest standing, and who profess strictly to follow the formula of the College, is generally found to be deficient of that vesicating power that would entitle it to the appellation of a speedy or instantaneous blistering application, and hence it often fails to meet the expectations of the prescriber. The physician being thus disappointed in the looked-for effect, too often ascribes the cause of the failure to the fault of the chemist; and the latter is, perhaps, no less disappointed and mortified, on being informed, when the prescription is next presented at his counter, that the blistering application has been directed to be obtained from some neighboring chemist, who has gained the physician's patronage, by carrying out his intentions more successfully than the formula of the College of Physicians would enable him to. This has been effected by preparing the Acetum Cantharidis with acetic acid nearly three times the strength of that ordered by the College. Beaufoy's Concentrated Pyroligneous Acid corresponds as nearly as possible with the "acidum aceticum" of the Pharmacopœia. The specific gravity is 1.048. One hundred grains of this acid will saturate eighty-seven grains of crystallized carbonate of soda. It consists of 30.8 of anhydrous acid + 69.2 of water.

As it is probable that the concentrated pyroligneous acid of commerce is frequently used for the acidum aceticum of the College, and as the pyroligneous acid supplied by different manufacturers is of very different strength, it is important in the preparation of Acetum Cantharidis, that the specific gravity and saturating power of the acid should be tested before using it.

Mr. Garden, of Oxford-street, and, I believe, some others, employ acetic acid of about the strength of aromatic vinegar for making the Acetum Cantharidis. 100 grains of Mr. Garden's Acetum Cantharidis required 198 grains of crystallized carbonate of soda for its saturation. This is, of course, a much more active application than that ordered by the College, and will often raise a blister in ten minutes; but although prepared with so strong an acid, it is still uncertain in its operation, and thus an hour or more is in some cases required to produce the same effect, that in others, would result in a few minutes. In a preparation of Cantharides this uncertainty appears remarkable, for one of the great advantages which the blistering fly is considered to possess over all other epispastics, consists in the certainty and uniformity of its operation. The action of the Acetum Cantharidis seems to be distinguished less by the characteristics which belong to Cantharides, than by those of acetic acid. So much indeed is this the case, that on my attention being called to the variable strength and uncertain operation of this remedy, I was soon induced to suspect that it owes its vesicating power chiefly, if not entirely, to the acetic acid. Subsequent experiments have tended to confirm this opinion.

Dr. A. T. Thomson, in his Dispensatory, describes the Acidum Aceticum of the Pharmacopœia, as "a useful and powerful substitute for a blister, when the effect of such an application is required to be rapidly obtained," and I believe that pure acetic acid will be found to possess all the efficacy of Acetum Cantharidis made with acid of the same strength. the following are the experiments upon which this opinion is founded:

Acetum Cantharidis was made according to the formula of the London College, and samples of the same were obtained from some of the first houses in town. The specific gravity of these varied from 1.059 to 1.061; 100 grains required from 70 to 72 grains of crystallized carbonate of soda for saturation. They were found to be of equal vesicating power; producing a blister in about three hours, when applied to the arm under a piece of adhesive plaster.

Experiment 1.—Acetum Cantharidis was carefully evaporated at a temperature not exceeding 100° Fahr., until reduced to the consistence of an extract. This had a bright transparent reddish brown appearance, with a slight smell of Cantharides, and a strong acid, not unpleasant taste.

Experiment 2.—A small quantity of the product of Experiment 1, was neutralized by the addition of a few drops of solution of ammonia, then spread on a piece of adhesive plaster and applied to the skin of the arm for twelve hours. No sensible effect was produced.

Experiment 3.—A small portion of the product of Experiment 1 was neutralized with carbonate of soda, and applied in the same manner as last experiment, with the same result.

Experiment 4.—A portion of the product of Experiment 1 was washed with distilled water to remove the free acid, and the residue applied to the skin for twelve hours, without any effect.

Experiment 5.—The product of Experiment 1 was exposed to the atmosphere until the acetic acid was nearly all evaporated, and then applied to the skin as before for twelve hours, a slight redness of the skin was produced.

Experiment 6.—Acetum Cantharidis was neutralized with caabonate of soda, then carefully evaporated until crystals of the acetate of soda were formed, and afterwards digested for three hours in rectified ether, with frequent agitation. The ether was then decanted off and allowed to evaporate spontaneously. After the evaporation of the ether, a very minute portion of yellow liquid was left, which reddened litmus

paper. This liquid applied to the skin for twelve hours produced no effect.

Experiment 7.—Acetum Cantharidis was mixed with an equal quantity of ether. The mixture was frequently agitated and left to stand for twelve hours. The ether was then decanted off, and allowed to evaporate spontaneously. A light yellow acid liquor remained, which on further evaporation afforded some appearance of crystallization.. Two or three drops of oil being mixed with this, it was applied to the skin for twelve hours, but produced no effect.

Acetum Cantharidis, obtained from Mr. Garden's, was submitted to the same experiments as the foregoing; 100 grains required 198 grains of carbonate of soda for saturation. On evaporation, as in Experiment 1, it afforded a dirty brown residue, amongst which were perceived globules of green oil. When deprived of acid and applied to the skin, it caused slight irritation. Neutralized with soda and then digested in ether, as in Experiment 6, it yielded, on the evaporation of the ether, a bright green oil, which, applied to the skin for twenty hours, caused a slight redness on the part, but no blister.

These experiments were repeated several times with the same result. They seem to indicate that acetic acid, of the strength ordered in the Pharmacopœia, is not a solvent of Cantharidin. In order more completely to determine this point, some pure Cantharidin was prepared according to Robiquet's process. It was found to be insoluble in acetic acid. Again, the residue of the flies, after the preparation of Acetum Cantharidis was digested in ether, and the oil obtained on the evaporation of the etherial tincture, when applied to the skin, raised a blister in fifteen minutes.

It is evident, therefore, that acetic acid is not a proper menstruum for exhibiting the acrid principle of the blistering fly.

In referring to another preparation of the Cantharis, namely, the Unguentum Cantharidis, we shall, perhaps, be enabled to account for the difference of opinion which exists respecting

its efficacy, by making, in this case, a somewhat similar investigation to that which we have just been pursuing. The Cantharides ointment is intended as a mild stimulating application for keeping up the discharge from a blistered surface. In many cases, however, it is found to be entirely void of acrimony, and, therefore, inapplicable for the purpose designed; whilst, in other instances, it proves too stimulating. This ointment is made by boiling the flies in water, and making an ointment from the inspissated decoction. Now, boiling water is capable of extracting the whole of the acrimony from the flies, and if, therefore, in the preparation of Unguentum Cantharidis, the decoction be carefully evaporated, without using much heat, the product will be sufficiently active to raise a blister. This I have proved by experiment to be the case. But the heat generally employed in effecting the evaporation, destroys all or nearly all the acrid principle of the fly, and often renders the ointment of little use.

Thus the strong blistering fluid is made by extracting from the fly, and preserving for use, an inert viscous matter, together with some salts of lime and magnesia, which the insect contains, and throwing away the cantharidin or blistering principle; while in the process for making the mild blister dressing, the active principle is retained, and the more inert matter rejected. In the former case, the efficacy of the preparation depends upon the acetic acid, which is the menstruum used; and, in the latter case, the ultimate attainment of the object intended, that is, the production of a mild ointment, is due to the decomposition or dissipation of the cantharidin during the evaporation; and as this will take place in proportion to the heat employed, the result must necessarily be uncertain and variable.

The celebrated Boerhaave proposed an amendment upon the Unguentum Cantharidis, by reversing the process. He recommended that the flies should be powdered, boiled in water, and strained; that the aqueous decoction be thrown away, and the residue of the flies be dried, finely powdered, and formed into a pommade, in the proportion of twelve to

sixteen grains of the powder to one ounce of ointment. Boerhaave ascribes to this ointment the property of keeping up the discharge from a blister, without producing that irritation found to result from the use of ointments, containing Cantharides in their natural state. It seems, therefore, that this ointment is intended also as a substitute for our ceratum lyttæ, which is a mixture of powdered Cantharides and simple ointment.

But although it would appear that the constitution and properties of the blistering fly have been partially overlooked, or imperfectly understood, yet experience has tended to confirm the estimation in which this insect has long been held by medical men as a vesicating application. The certainty and safety of their operation have obtained for Cantharides the preference over all other vesicating substances; and we, therefore, find them forming the principle ingredient of the blistering applications in this country, on the continents of Europe and America, and among the Chinese. They present almost a solitary exception to the fate which has befallen the long list of animal substances, consisting of almost every conceivable part of almost every known animal, which figured in the early history of our Pharmacopœias. The blistering fly, may now, therefore be considered as fully established in our Materia Medica. Its employment as a medical agent is derived from great antiquity, but it has been doubted whether the ancients were acquainted with its external application as a blister. Hippocrates recommends the removal of the head, feet, and wings; but Galen, on the contrary, contends that the whole insect should be used. Dioscorides and Avicenna adopt the latter opinion, remarking, that the parts rejected by Hippocrates serve as an antidote to the venom of the insect. These opinions are probably entitled to but little consideration; excepting, inasmuch, as they show the attempts made at that early period to investigate the properties of this substance, and as it is still held in equal, if not greater, estimation as a remedy, the time we may devote in pursuing the examination of its active constituents will not, it is presumed, be uselessly

or unprofitably spent. The advantage which our continental neighbors are, by some, considered to have gained over us, in the preparation of blistering applications, should also be a stimulus to increased energy in this investigation. The vesicating taffetas of the French certainly appear to have advantages over our greasy and offensive blistering plaster; and the question may fairly be raised, whether this latter might not give place to an equally certain, efficacious, and inexpensive, but more cleanly and elegant application. The blistering tissues introduced in this country by Messrs. Smith of Edinburg, and Mr. Butler, of St. Paul's Churchyard, possess all the requisites of elegance and cleanliness that could be desired, but a proprietory nostrum must necessarily be limited in its usefulness, from the want of confidence attaching to any remedy, the composition and preparation of which is not known. In the *Journal de Pharmacie*, for 1837, is a report by Cap and Soubeiran, to the Society of Pharmacy of Paris, on vesicating taffetas, which gives some insight into the mode of preparing those applications. The process recommended for their preparation, is that adopted by Messrs. Henry and Guibourt, which consists in liquifying, with double its weight of wax, the green oil that is obtained from Cantharides by means of ether. The mixture is spread upon a sheet of waxed linen or paper, in the same manner as common adhesive plaster. Other processes are described in which euphoribum is employed, but the operation of these is stated to be accompanied with more pain, and the effect to be less readily healed. An objection has been found to apply to the above process of Messrs. Henry and Guibourt, which is, that the concrete Oil of Cantharides loses its efficacy by long exposure to the atmosphere. Vesicating tissue paper, which I prepared in this manner, although it acted perfectly well when recently made, lost its blistering effect, after being exposed to the air for a few weeks. I observe in the formula of M. Dechamps, and also in that of M. Thierry, that a tincture of benzoin, or of balsam of tolu, is ordered to be laid over the surface of their taffetas, the object of which no doubt is, by forming a

varnish, to preserve the Cantharidin from the action of the atmosphere. I have not had an opportunity of ascertaining how far this would prove an effectual preservative.

But, in order to determine the best form for the application of Cantharides, it is necessary to be acquainted with their constitution. As early as the year 1803, their examination was undertaken by the French chemists, and in the *Ann. de Chimie* of that year, Permentier gives an account of Dr. Thouvenel's analysis of Cantharides, by treating them successively with water, alcohol, and ether. In this way he obtained,

Three-eighths of their weight, of yellow extractive matter, obtained by water. This was very bitter, and yielded an acid liquor by distillation.

One-tenth ditto, of concrete green oil, subsequently obtained by spirit, with the smell of Cantharides, and yielding a sharp acid and thick oil on distillation.

One-fiftieth ditto of a yellow concrete oil, subsequently obtained by ether, and analagous to the preceding.

One-half ditto, of insoluble parenchyma.

Thouvenel concluded that the vesicating qualities resided in the green concrete oil, and that the action on the urinary organs was due to one of the acids obtained by distillation. Permentier observes in this paper, that Cantharides produce a more energetic effect when applied in coarse powder, than when finely levigated. Dr. Pereira states, that

"The active and odorous principles of Cantharides reside principally in the sexual organs of the animals. Both Farines and Zier tell us, that the soft contain more active matter than the hard parts. It appears also that the posterior is much more acrid than the anterior portion of the body, and Zier says, the ovaries are particularly rich in this active matter. If so, it is evident that we ought to prefer large female to male insects. It is a well known fact that the odour of these animals becomes much more powerful at the season of copulation than at any other periods, and that persons sitting under

the trees, in which these insects are, at this season more particularly, are very apt to be attacked with opthalmia and ardor urinæ."*

In the *Ann. de Chimie* of the year 1804, Deyeux, has communicated the result of Beaupoil's examination of Cantharides; which differs in some respects from that of Thouvenel. Beaupoil found that the aqueous decoction of Cantharides, when mixed with alcohol or with ether, separates into two parts, nearly equal; the one in the form of a black glutinous precipitate, insoluble in alcohol, and the other a yellow-brown matter which alcohol takes up very readily. He found that both these products, when applied to the skin, produced blistering in nearly the same time; and that the green concrete oil, to which Thouvenel ascribed all the blistering property of the fly, took no effect when applied alone, but caused blistering when mixed with wax.

These discrepancies remained unexplained until the year 1810, when Robiquet made known the details of his more accurate and satisfactory analysis of Cantharides. His experiments bear so forcibly upon the principles under consideration, that they appear entitled to a more detailed account than is met with in those elementary works which allude to them.

Adopting the same means of extraction, by water, alcohol, and ether, as the preceding experimenters, Robiquet proceeded as follows: Cantharides, in powder, were boiled with repeated portions of distilled water until nothing further was yielded to the liquid. The residue of the flies, was next treated with alcohol, and the tincture thus formed, on evaporation, afforded a green oil similar to that obtained by Thouvenel and Beaupoil This oil was found to possess no vesicating properties. The decoction was now carefully evaporated to the consistence of a soft extract. It possessed the vesicating quality of the fly in a powerful degree. Boiling alcohol added to this took up a yellow matter and left a black glutinous residue. This

* *Materia Medica*, Part II., page 1368.

process was repeated with fresh boiling alcohol, and agitation as long as any color was afforded to the alcohol. The black residue was now found to be entirely destitute of vesicating power, while the alcoholic tincture possessed it in an eminent degree. The alcoholic extract was evaporated to dryness, and rectified ether added to the residue in a closed flask. After having been macerated some hours, with occasional agitation, a light yellow tincture was obtained, which, allowed to evaporate spontaneously, afforded small crystalline micacious plates. The yellow matter in which these crystals were formed, was removed by cold alcohol, and the crystals dried between folds of blotting paper. The yellow matter removed by the alcohol was found to be inert, but the crystals possessed powerful blistering properties. The 1-100th part of a grain, placed on a slip of paper and applied to the edge of the lower lip, occasioned small blisters in about fifteen minutes. Some pommade being applied, served only to extend the action over a wider surface. Some atoms of the crystals dissolved in two or three drops of almond oil were rubbed over a small piece of paper and applied to the arm: in six hours a blister was formed the size of the paper. These crystals were insoluble in water, and in cold alcohol, but soluble in boiling alcohol, being again deposited in crystals, as the alcohol cooled. They were soluble also in ether, and very soluble in oils. The name of Cantharidin has been given by Dr. T. Thomson to this crystalline substance, which imparts the peculiar value to Cantharides.

Robiquet explains the difference between the result of his experiments and those which had previously been performed, by referring to the facts, that Thouvenel in treating the flies with water, had merely made an infusion of them, by which means the Cantharidin had not been extracted by the water, but was afterwards obtained with the green concrete oil, in the alcoholic tincture ; but that Beaupoil, on the other hand, caused the flies to be boiled in the water, although not so as to remove the whole of their acrid principle, and he therefore had a portion of the Cantharidin in each of his products.

He also remarks, that although Cantharidin in its isolated state is insoluble in water, and in cold alcohol, yet it is taken up by both these liquids, when associated with other constituents of Cantharides, as the green concrete oil, or the yellow matter.

The latter portion of Robiquet's paper is devoted to an account of his investigations, with the view of determining the character of the free acid which is always found in infusions of Cantharides. It is worthy of particular observation, that he discovered in recently collected Cantharides a considerable portion of uric acid, but was unable to obtain the same result from those which had been kept some time. On the other hand, the latter were strongly impregnated with acetic acid. Referring to the fact of his not being able to discover uric acid in old Cantharides, he states, "and if I had not obtained it frequently from the fresh Cantharides, I should regard the result as doubtful." He also remarks, "it is curious to observe that these insects, which exercise so marked an action upon the urinary organs, present, in their composition, several points of analogy with urine."

Thierry's process for procuring Cantharidin is, to macerate the bruised fly in ether for several days; to obtain the whole of the etherial essence by displacement; to distil off the ether, and to treat the residue with boiling alcohol, and animal charcoal. The Cantharidin is thus obtained pure, in crystals. 1000 parts of Cantharides yield four parts of pure Cantharidin.

It may also be obtained by treating the flies with alcohol instead of ether.

Cantharidin possesses neither acid nor alkaline properties. According to Gmelin, it may be considered a solid volatile oil. It is fusible at a moderate heat, forming a yellow oil, which by a stronger heat is dissipated in white vapors, and again condenses into acicular crystals. In Dr. Pereira's account of Cantharidin, it is stated to be soluble in concentrated boiling sulphuric acid, forming a brown solution. It is also

soluble in boiling nitric and muriatic acids, without changing color, and is again deposited on cooling. It is dissolved by potash and soda; but when concentrated acetic acid is added to the solution, the Cantharidin is precipitated. Ammonia is without action on it. According to Regnaud, it consists of carbon, 61.68; hydrogen, 6.04, and oxygen, 32.28.

Thus we have the active principle of Cantharides eliminated from those inert or useless matters, with which it is associated in its natural state; the character and properties of this principle, Cantharidin, are described; and the best means are pointed out, for effecting its solution, whether it be in an isolated or combined form. Upon these data may, perhaps, be founded improvements in the preparation of our vesicating applications. Having alluded to objections which attach to some of the preparations in use, it has been my object to adduce the result of such investigations, as far as they have hitherto been carried, as may tend to elucidate the subject, by explaining the cause of those imperfections that are met with, and suggesting the means for their remedy.

The Chairman inquired whether the pain which usually accompanies a blister, is essential to its efficacy; he had heard it stated by a physician, that this was the case.*

Mr. Ure remarked that the pain and irritation were merely symptoms of vesicating action. In acute cases it is often necessary to produce immediate vesication, and then boiling water or essential oil of mustard would be most effectual. In more chronic cases, the slow and regular action of a blister is preferable.

* The following is Dr. Pereira's statement: "It was formerly supposed that the efficacy of blisters was in proportion to the quantity of fluid discharged. But the truth is, that the therapeutic influence is in proportion to the local irritation, and has no more relation to the quantity of fluid discharged, than that the latter is frequently (not invariably) in the ratio of the former. Stroll's axiom is therefore correct, *Non suppuratio sed stimulus prodest.*"—*Materia Medica,* Part II., page 1372.

Mr. Samwell observed, that the effects of a blister are very much modified by the natural texture of the skin, and that some persons are much less irritated by these applications than others.—*Lond. Pharmaceutical Trans. Oct.* 1, 1841.

ART. LIX.—MR. LISTON'S ISINGLASS PLASTER.

BY JACOB BELL.

Mr. Liston has for many years been in the habit of using, after operations and for other surgical purposes, a plaster consisting of oiled silk covered with a coating of isinglass. This plaster is mentioned in his well known work on Practical Surgery.*

The following is the method of preparing it. Moisten an ounce of isinglass with two ounces of water, and allow it to stand for an hour or two until quite soft; then add three ounces and a half of rectified spirit, previously mixed with one ounce and a half of water. Plunge the vessel in a saucepan of boiling water, and the solution will be complete in a few minutes.

Having stretched the oil silk on a board, by nailing it round the edges, apply the solution of isinglass with a brush taking care to move the brush evenly and in the same direction, making it smooth as you proceed—as in varnishing a picture. When quite hard and dry apply another layer, in the same manner, but moving the brush in the opposite direction, in one case horizontally in the other perpendicularly. In this manner apply four coats of the solution, or even a fifth, if the surface be not entirely smooth. The last layer should be reduced in strength by the addition of a little more

*Third Edition, p. 35.

water and spirit. An ounce of isinglass is sufficient for about a square yard of the plaster.

The following precautions should be observed:—the distance between the nails should not be more than an inch and a half, otherwise the oil silk will shrink in festoons and will not remain flat. The isinglass must be well soaked in water before the spirit is added, otherwise it will not make a complete solution; and the spirit, when added, must be diluted with a portion of the water, to prevent precipitation of the isinglass. The brush must be a flat "hog tool," such as is used for spirit varnish, and well made, otherwise the hairs will be found to come out, and this is an inconvenience, as the operation must be performed quickly while the solution is warm. The solution, when cold, should be of the consistance of blancmange.

Repeated experiments have shown that gelatine does not answer the purpose as a substitute for isinglass, either alone or in any proportions. A sample is on the table, in which the first three layers were composed of a mixture of the two substances, and the last is pure isinglass; in another sample only isinglass was used, and it will be seen that the latter is much more adhesive.

The oil silk has been, in a great measure, superseded by the use of a membrane, consisting of the peritoneal covering of the *cæcum* of the ox, rubbed down and carefully polished in the manner in which the common goldbeater's skin is prepared. The following is the report of this plaster, furnished by Mr. Ancrum, Mr. Liston's Assistant at the North London Hospital.

"From the extreme thinness of the plaster, the wounds can be examined without its removal. It adheres much better than plaster made with isinglass spread on silk; and in the first instance of its application becomes firmly fixed. It is difficult to fix the isinglass plaster spread on silk, unless it is very good. From the extreme tenuity of the membrane plaster, it is equally unirritating with goldbeater's skin; and

when once applied it remains so accurately adherent, that it does not require to be changed for many days. Altogether, after a good deal of experience in all the different plasters, we find it the best uniting material that has ever been produced."

In applying the isinglass to the membrane plaster, the directions already mentioned, with reference to the oil silk, may be observed, but a layer of drying oil is spread on the other side of the membrane.—*Ibid.*

ART. LX.—THE APOTHECARIES' COMPANY v. GREENOUGH.

We would gladly avoid any allusion to a subject which is calculated to give rise to party controversy, but the remarks which have appeared in other periodicals on the decision in the above case, oblige us to advert to it.

We cannot consider the case of Mr. Greenough at all applicable to Chemists and Druggists in general, and consequently the Pharmaceutical Society could not interfere in it in any way. When applied to by the defendant for protection some months back, the Council decided, in accordance with the opinion of their solicitor, that they could not render him any assistance, as he had been in the habit of acting professedly as a surgeon, *designating himself as such* in his bills, and charging for attendance as a medical practitioner. It appeared on evidence at the trial that he had even boasted of having 300 patients on his books. By this course they consider that he had exceeded the legitimate functions of a chemist and druggist, and had, in fact made himself ineligible as a member of the Pharmaceutical Society.

Had the case been one in which a chemist had casually, on an emergency, or as an act of humanity, visited a patient, we

are confident that (even if an action had been brought, which is very unlikely,) a different verdict would have been returned.

We, therefore, think the case of Mr. Greenough cannot be considered a precedent which affects materially, if at all, the interests of chemists and druggists in general.

The Editor of the *Lancet* expresses the opinion "that it was the intention of the Legislature, when the act (of 1815) was passed, that the new statute should not in any way affect chemists and druggists, either in prescribing or otherwise;" and the law having been thus interpreted from that time to the present, we consider that its authority is in no degree impaired by the verdict of a jury in a case of no ordinary intricacy, which is not applicable to chemists in general.

But seeing that druggists have this latitude conceded to them, it is incumbent upon them to be especially circumspect in the exercise of the power they possess. Those who avail themselves of a discretionary privilege to the utmost possible extent in violation of the dictates of propriety, bring discredit and injury on the body to which they belong, and afford a pretext for the imposition of restrictions. By acting with becoming moderation and prudence, and proving that we are worthy of the confidence implied in the privileges granted to us, we shall most effectually serve our own interest and disarm the power of extraneous opposition.

The question is not—Whether druggists ought to be invested with all the authority of Medical Practitioners? This we never pretended to claim, as it would nullify the fundamental laws which regulate the profession. The definition of the term chemist and druggist in the by-laws of the Society, is "a person who has been regularly apprenticed to, or educated by a vender of drugs or dispenser of medicines, and who does not profess to act as a visiting Apothecary or Surgeon." In this definition, medical practice is alluded to, merely for the purpose of distinguishing the chemist and druggist from the Apothecary. Yet it is necessary that druggists should be allowed to explain the nature and uses of the substances which

they sell; and as it is impossible to define accurately the boundary between the performance of this duty, and giving advice in simple cases, the discretionary power which they have always possessed is proper and even necessary.

The Editor of the *Medical Gazette* observes, in reference to this subject, "It is plain from the present course of events, that the chemists will not be restrained within those limits of their business which do not involve an infringement of the Apothecaries' Act: they cannot be so restrained, nor, if they could, do we think it altogether prudent that they should, if they will only consent to submit to some fair test in proof of their fitness to be legalized for higher functions."

We are anxious to discourage the extensive practice of medicine by druggists; but we contend, and have always contended, that severe legal restrictions would be attended with injustice, and would also be injurious to the public. Moreover, we repeat that such restrictions could not be enforced. The law against "counter practice" in France, is particularly strict; yet we know that it is constantly evaded, and is therefore inoperative. While we endeavor to inculcate a sense of honor and prudence among our brethren, which shall prevent their exceeding the proper limits, we shall continue unflinchingly to advocate the continuance of *all* their existing privileges.

The question comes to this—Should it be lawful for any member of the community to swallow a dose of medicine without medical advice? If this be allowed, from whom are the public to obtain information as to the doses and properties of the medicine?—Undoubtedly, from the druggist of whom they procure it.

But, according to the definition of the term "practicing medicine," this term is held to mean "recommending or administering a remedy for any ailment or disorder of the body or mind, or any part thereof;" and if this act is to be visited with a penalty, *the druggist would be liable to fine and imprisonment every hour of the day, for giving that information to his customers, without which it would, in many*

cases, be unsafe to entrust them with the medicine which they are permitted by law to purchase.

The Editor of the *Lancet*, in alluding to "that frightful evil called 'counter practice,'" states, that it has "doubtless been attended with a dreadful sacrifice of human life." We cannot pass unnoticed a statement of this kind, which is a serious charge against the body with which we are connected, and we think the author of it should have informed us how many cases of death from "counter practice" have come before him during the time that he has officiated as coroner for the county of Middlesex.

In conclusion, if every druggist in the kingdom would read the leading article in the *Lancet* of September 11th, all doubt of the *necessity* of the Pharmaceutical Society would be removed. The leading article in the *Medical Gazelte*, of the same date, is no less conclusive on this point, although the Editor takes a different view of the case from his "contemporary."—*Ibid.*

ART. LXI.—ACADEMY OF MEDICINE OF PARIS. REPORTS ON POISONING BY ARSENIOUS ACID.

(*Extract.*)

Meeting of February 16*th*, 1841. M. Caventou, on behalf of M. Chevallier and himself, reported—1. On a medico-legal experiment relative to a case of poisoning by arsenious acid, made by Mott, Fan, and Bergés, before the court of Assize of Arriege.

2. A second report in the name of M. Pelletier and himself, upon an analogous case by MM. Girardin and Morin.

The conclusions from these reports are conformable to the results and experiments of Orfila, on the same subject; the reporters suggest the publishment of the papers in the bulletin, and propose a vote of thanks to the authors. (Adopted.)

M. Orfila rose, not to oppose these reports, but to thank the committee for the attention which they had bestowed upon an experiment which went to prove, that in proceeding in the mode which he had prescribed, there could not be procured, from the viscera of individuals not poisoned by arsenic, any trace of that metal, although putrefaction was fully established. His assertions on this point had been so positive that he had been several times surprised to read and hear repeated that he had developed arsenic from bodies in a state of putrefaction. He wished also, to call the attention of the Academy to a certain number of facts already partly published, and which would appear to invalidate many of the results announced to the Academy. In fact MM. Flandin and Danger had read to the Institute, a memoir of which the principle conclusions are: 1. That arsenic does not exist in the human body in its natural state. 2. That the earth of cemeteries does not contain it—at least that they were not able to detect it in that of Mount Parnassus and Pere-Lachaise. 3. That by means of

Marsh's apparatus and substances not containing arsenic, they could obtain spots similar to those from arsenic, and affording all the reactions of arsenious acid. Before examining these three propositions, M. Orfila stated it to be desirable, that the first two assertions should be cleared of all doubt—that thence would be avoided in future, the objections so frequently repeated by legal advisers, objections drawn from the fact of arsenic naturally existing in the human body, and the earth of cemeteries. This problem resolved, and which has for its object to demonstrate the presence of arsenic in all the viscera of persons thus poisoned, it can no longer suffer the least opposition on the part of the contradictors.

On the first point, M. Orfila expressed himself thus: *Arsenic cannot be obtained from the human body.* As far as the viscera are concerned, M. Danger and Flandin have only repeated what M. Orfila had already established. In addition, he also assumed that the bones do not contain it. Without any further explanation, M. Orfila stated, that on the third of November last, he had placed at the command of the Academy, a sealed note, which is in the hands of the perpetual secretary, and which contains his opinion on this point.

M. Orfila never said that the earths of cemeteries were all and constantly arsenical; the title of his third memoir would prove to what extent he reserved himself on this point—the title is: *On the earths of cemeteries—on the arsenic which they* may *furnish, and upon the medico-legal deductions which should be drawn from the* possible *existence of an arsenical composition in these earths.* M. Orfila reported in the same memoir, experiments made upon three specimens of earth taken from the cemetery of Villey-sur-Tisle, near Dijon, and he proved that only one of these afforded arsenic. The same fact was established with regard to the cemetery of Mount Parnassus, he having extracted arsenic from one portion and not from another. This diversity of result is perfectly explained, by calling to mind that these earths, when arsenical, contain this metal under the form of insoluble

arsenite of lime, which hence remains in the part where it was accidentally deposited, and is not dispersed throughout the neighboring parts. MM. Flandin and Danger might then have been unable to find arsenic in one portion of the soil, without being able to say that it does not exist in portions not examined by them.

Examining the question of the spots produced by MM. Flandin and Danger. According to these gentlemen, on introducing into Marsh's apparatus, while in operation, the sulphite and phosphite of ammonia, still more Dippel's animal oil or oil turpentine, spots may be procured similar to the arsenical deposits, and which afford all the reactions of arsenious acid. M. Orfila stated that he had prepared with 30 centigrammes of sulphite of ammonia, a like quantity of phosphite and 18 drops of oil of turpentine, spots, equal to those procured by MM. Flandin and Danger; and which he presents to the Academy, together with some produced by arsenic. The difference between these deposits are so striking that he can scarcely suppose it possible to mistake the one for the other. In fact the former are large, brown with a varied reflection of yellow, very brilliant; it is very easy to distinguish them with the naked eye, so little do they possess any similarity to the brown arsenical spots. They promptly redden moistened litmus paper, even when recent, while the arsenical spots, even when old do not change this paper, at least if not procured by a strong flame and a portion of sulphuric acid has not been projected from the apparatus. To perform this experiment, the moistened paper should be applied upon the spot and then pressed with a glass rod, and not with the finger, for this constantly reddens the test paper.

Strong nitric acid neither dissolves nor detaches entirely, *when cold*, the spots produced by MM. Flandin and Danger even when assisted by the action of a glass tube. At the boiling temperature, they slowly dissolve, and produce a yellow liquid. If this liquid be evaporated to dryness there remains a residue of yellow, bordering slightly on a brown

color, which may be deprived of color or at least brought to the state of a yellowish white residue, by repeated boilings with small proportions of strong nitric acid. This residue, cooled and touched with a drop of nitrate of silver, assumes a yellow similar to that of phosphate of silver, and *not a brick-red* color.

The arsenical spot, on the contrary, *immediately disappears* in *cold* nitric acid, and if the liquid be evaporated, arsenic acid remains, with which nitrate of silver will instantaneously produce a *brick-red* color.

A complete solution of the question, whether it is possible to obtain spots, such as are spoken of by MM. Flandin and Danger, by carbonizing the intestines of individuals not poisoned, and introducing an aqueous decoction of the residue into Marsh's apparatus? is to be found in the fact that if the carbonization be *complete*, and performed according to the rules laid down, then the sulphite and phosphite of ammonia which may exist in the organic matter is transformed into sulphate and phosphate of ammonia, which do not afford the slightest spot with the apparatus of Marsh. This result is so well known that it is useless to support it by new proofs.

But, it constantly happens that when the organs of a person poisoned are *comptelely* carbonized, if the organ had retained any of the poison, a greater or less number of arsenical spots may be obtained.

M. Orfila spoke concerning spots far more important than those noticed by MM. Flandin and Danger because they bear more resemblance in their physical character at least, to arsenical spots. He exhibited several plates upon which were found the spots obtained, whether with bichloride of mercury, with chloride of tin or of lead, or finally with sulphate or chloride of zinc. It is sufficient to introduce any of these into the apparatus of Marsh, acidulated either with sulphuric or hydro-chloric acid, and to act *with a strong flame*, to collect on a porcelain plate, brilliant, shining black spots, similar in color to arsenical deposits. These salts are carried up with the hydrogen gas, deposited on the plate and decomposed by

the same gas. He did not explain the nature of these spots, but affirmed that they could readily be distinguished from those of arsenic. 1. Because they are only partly volatile, and that with difficulty under a strong flame, at least when not exceedingly thin. 2. Because although cold nitric acid dissolves them rapidly, they never furnish on evaporation, a residue with which nitrate of silver will produce a brick-red color. Likewise, these spots cannot be obtained with a very small flame, although there may be much salt of zinc, lead, &c., in the apparatus, while the arsenical spots are produced readily with a feeble flame. MM. Thenard, Dumas, Regnault and Boussingault, have already obtained similar spots by sulphate of zinc.

There are other spots which are readily produced even with a *moderate* flame, by allowing this to fall upon plates formed of *certain* kinds of pipe clay; the oxides of lead and of tin which enter into the composition of the glazing applied to this kind of pottery, are reduced by the hydrogen, and there result spots either of a light or deep gray, and sometimes blackish, tarnished—slightly, or not at all volatile, and insoluble in nitric acid, either hot or cold. These spots cannot be confounded with those from arsenic.

In conclusion, these spots cannot be mistaken for arsenical spots, by any conversant with the subject.

A chemist, accustomed to these researches will not be in the least degree embarrassed in establishing the distinction between these spots.

A person of moderate ability, but attentive, will recognise, without difficulty, and solely by the character laid down, whether or not the spots are arsenical.

M. Chevallier added to what M. Orfila had stated concerning the spots upon plate or pipe clay, that there were some spots which were due to carbon; so that the plate used may afford spots not due to reduced lead, but resulting from the conversion into carbon, of substances which had penetrated the substance of the plate. He established that MM. Girardin and Morin had merited well of science by proving, in their

medical report, that the animal substances which they had examined do not contain arsenic. But he said that already in several judiciary reports he had proven the absence of this metal from the viscera of the human body. He besides stated, that in conjunction with M. Ribes, jr., Surgeon to the Invalids, he had made numerous experiments with the view of detecting arsenic in the blood, the existence of which Belge had announced, but the results were negative.

March 16*th*, 1841. M. Chevallier, on behalf of M. Caventou and himself, made a report upon a case of arsenical poisoning observed by M. Bouillet. He stated: 1. That the patient died although he took immediately *colcothar*, which was substituted for *the hydrated oxide of iron, prescribed by the physician*, and was followed by diuretic drinks. 2. That the patient discharged very little urine, but that the urine contained arsenious acid. Dr. Bouillet having stated that the urine discharged on the fifth day, contained more arsenic than that on the fourth; the reporters observed that the fact might be possible, but that nothing in the observation of Dr. Bouillet demonstrated the truth of the assertion. Finally, the reporters suggested that the thanks of the Academy be presented to the author.

M. Orfila addressed the Academy on the subject of the report in the following note:

I request permission to read to the Academy, some observations in regard to the fact communicated by Dr. Bouillet. My observations relate to the use of colcothar and hydrated peroxide of iron; and to the presence of arsenious acid in the urine of an individual poisoned by this substance.

Colcothar and Hydrated Peroxide of Iron. I purposely notice these two separately, because it is important not to confound them together. Colcothar is an anhydrous oxide which does not exercise any neutralizing power with arsenious acid; for, if we boil for two hours 16 grammes of this oxide with water, holding in solution 2 millegrammes (1.25 gr.) of arsenious acid, the filtered liquor will still afford arsenic by means of Marsh's apparatus; 16 grammes, then,

of this oxide have not neutralized even 2 millegrammes of arsenious acid, which is the same as saying that it requires more than 2000 grammes (12½ ounces) to absorb one grain of this poison. It is evident from this fact that colcothar should be rejected in the treatment of poisoning by arsenic. May the same be said of the hydrated peroxide? I do not think so, although I do not allow, that it is *completely* capable of neutralizing arsenious acid. Let us examine the facts of the case.

M. Guibourt proved, in a paper printed in 1839, that 100 grammes of hydrated peroxide of iron, inthe state of *magma*, was sufficient to absorb and neutralize 3½ decigrammes (7 grs.) of arsenious acid. I have proven by numerous experiments, that if the hydrated peroxide, instead of being in the state of *magma*, be used dry, that is to say hydrated but not moist, and at the temperature of 36 or 40° C., 16 grammes will neutralize about 6 decigrammes (12 grs.) of arsenious acid. At least the aqueous liquor, resting over 16 grammes of the hydrated oxide, left for some hours in contact with 6 decigrammes of arsenious acid, did not become yellow on the addition of a solution of hydrosulphuric acid, to which some drops of hydrochloric acid had been added.

On the other hand, the experiments of MM. Leseur, Bouley, jr., Nonat, Deville and Sandras, &c., have established that animals never die poisoned by arsenious acid, although sufficient to produce death has been administered, provided they have taken the hydrated peroxide in sufficient quantity to neutralize the whole of the arsenious acid. MM. Nonat, Deville and Sandras, have advised, and with reason, to use in preference the dry hydrated peroxide, because it contains in the same weight, four or more times the amount that it does in the state of magma; and they also advise to give 16 grammes of dry hydrated oxide for each grain of arsenious acid to be neutralized.

It is curious and useful to resolve the problem, as to what extent the compound of arsenic acid and hydrated peroxide of iron formed in the stomach of individuals poisoned, retains its

poisonous properties. MM. Nonat, Deville, and Sandras, have announced that this compound is poisonous. The experiments which I have performed leave no doubt on this point. I administered to robust dogs, of mean size, 32 grammes of dry hydrated peroxide of iron, which I had previously combined with 11 grammes (20 grs.) of arsenious acid; the ferruginous compound did not contain an atom of free arsenious acid; it could be boiled with water without yielding to that liquid the least trace of the poison. The animals who took this sub-arsenite, had more or less abundant alvine evacuations, and soon exhibited all the symptoms of poisoning by arsenic; they died in 28, 30 and 40 hours, provided vomiting was prevented, and, on examining the body, arsenic could be detected in the urine, and in the liver; the digestive tube was inflamed.

Arsenic acid reacts with colcothar and hydrated peroxide, precisely as the arsenious acid.

I conclude from the preceding facts:

1. That colcothar should never be employed as an antidote to arsenious or *arsenic* acid, because it does not neutralize these poisons, even in an exorbitant dose.

2. That dry hydrated peroxide of iron absorbs and neutralizes a large amount of these acids, forming sub-salts of iron, which are poisonous, but less deleterious than the acids themselves; the unfortunate results from these sub-salts evidently depends upon their decomposition by acids contained in the stomach, and the consequent absorption of the liberated arsenical acid.

3. It is consequently useful to administer this dry hydrated peroxide, previously suspended in water, especially if vomiting be produced; for then, independently of that part of the poison expelled in the state of the *arsenical acid* by vomiting, the patient will also reject the *sub-salt of iron*, which is formed in the stomach and which will contain a considerable portion of the arsenical acid.

4. That when vomiting is not produced we should but slightly fear the presence in the stomach of the sub-arsenical

salt, although somewhat poisonous, because as soon as these salts are decomposed by the acid of the stomach, the arsenical acid set free is seized and neutralized by another portion of the peroxide, which, as is constantly recommended, *should be administered in large amount.*

Let me add a few words upon the complications in medico-legal research, which may arise from the presence of hydrated peroxide of iron in the digestive organs. I announced last September, that certain colcothars and certain hydrated peroxides of iron of pharmacy, contained arsenic, and that it is sometimes sufficient to introduce only a few grammes into Marsh's apparatus, to obtain numerous arsenical spots. Suppose that, in a case of poisoning by an arsenical acid, the hydrated peroxide of iron had been administered, and being subsequently extracted from the stomach or intestines, was recognized as arsenical; how shall we determine whether the arsenic furnished, is derived from the peroxide of iron, naturally containing arsenic, or from the sub-salt of iron, resulting from the combination of the peroxide with an arsenical acid taken as a poison? This question, of incontestable importance, is easily resolved.

1. Every fact leads to the belief that, when poisoning results, the arsenical acid has not been entirely neutralized by the peroxide, with which it is perhaps mixed; if so, it will suffice to boil, for 25 or 30 minutes, the peroxide with distilled water, which will dissolve the *free* arsenical acid, while it will not exercise any action upon the arsenic naturally contained in the peroxide of iron, or upon the arsenite, or arseniate of iron which it may have formed.

2. Admitting that boiling water has not dissolved traces of arsenious or arsenic acid, then shake up 15 or 16 grammes of the peroxide of iron well washed, with as much alcoholic potassa in the *cold;* this alkali, which will not separate a single atom of the arsenic naturally contained in the peroxide, will combine with the arsenical acid which may have been neutralized by the peroxide, *in however small an amount the notable quantity of this acid may be* in the sub-salt of

iron. The arsenite of potassa dissolved in the water may be readily recognized, either by the apparatus of Marsh, or by the hydrosulphuric acid gas, after saturating the excess of alkali.

If in place of acting in the cold, we boil, for two hours, the above proportions of peroxide of iron and potassa, the filtered liquor will contain arsenic, whether we operate with certain peroxides naturally containing arsenic, or with those which have absorbed an arsenical acid in the digestive canal.

Presence of arsenic in the urine of individuals poisoned by an arsenical preparation. Since, latterly MM. Flandin and Danger, have doubted the existence of arsenic in the urine of certain animals, poisoned by arsenic, I judge proper to add to what I have already published on this point :

1. This metal has been found in the urine of dogs poisoned by the application of a decigramme of arsenious acid, applied through the subcutaneous tissue of the thigh, or by means of the stomach, from the administration of 60 or 75 decigrammes of arsenious acid in fine powder, although the animals had taken neither food or liquids for twenty-four hours; or finally by the introduction into the stomach of 20, 30 or 40 centigrammes of this poison dissolved in water.

2. That in fact, the urinary secretion is *sometimes* suspended in this poisoning, and that there exists but a few drops of urine in the bladder.

3. That it may likewise happen, when death takes place, at the end of a few hours, that the arsenious acid may not have as yet arrived at the bladder. I am so convinced of the truth of these assertions, that I willingly offer to demonstrate them to MM. Flandin and Danger. Of all the processes contrived to detect the presence of arsenic in the urine, that which in my opinion deserves the preference, consists in treating this liquid with nitrate of potassa, as I have previously pointed out in a former paper on arsenic. It was thus that M. Chevallier extracted arsenic from a very small quantity of urine voided by the patient, who was the subject of M. Bouillet's observation laid before the Academy.

M. Chevallier in answer to the remark of M. Orfila, stated his opinion to be: 1. That the hydrated peroxide of iron is an excellent antidote for arsenic, explaining the term, by saying, that previously we possessed no certain antidote for arsenious acid, whilst numerous facts collected in Belgium, Germany and in France, facts set forth in the excellent memoir of M. Tierrot, a pharmaceutist of Bourg (Ain,) and subsequently in several scientific journals, have made known all which may be derived from the use of this oxide. 2. That arsenic will not be met with in the oxide of iron, prepared by dissolving sulphate of iron, and passing through it hydro-sulphuric acid gas, set aside to deposit, then filtering, boiling, afterwards precipitating by an alkali, washing the precipitated oxide and preserving for use. 3. That the oxide of iron given even a long time after the poison, still acts, as has been demonstrated by the facts published in the medical journals.

M. Bally asked whether hydrated peroxide of iron acts as an antidote for arsenic acid. M. Chevallier thought that further experiment was necessary to reply affirmatively. Meanwhile he observed, that in horses, poisoned accidentally with arseniate of potassa, it was proven that those to which the hydrated peroxide was administered, died later than those which were not treated with this oxide.

Meeting of March 23. M. Bally having inquired at the last meeting whether the peroxide of iron was an antidote for arsenic acid as well as for arsenious acid—M. Orfila stated that, since the last meeting, he had made experiments, from which it results that the peroxide of iron acts upon arsenic in the same manner as upon arsenious acid. He likewise was desirous of knowing whether the poisonous action of arsenic acid was as intense as that of arsenious acid; in fact, he gave 20 decigrammes of arsenic acid to a large dog; this dose was sufficient to produce death. He associated with the same dose of arsenic acid, an ounce of peroxide of iron; this mixture was injected into the stomach of a dog, and the œsophagus immediately tied; the animal lived several days, although the former had died in a few hours.

Journ. de Chim. Med.

ART. LXIII.—ON HIPPURIC ACID AND ITS TESTS.

BY ALEXANDER URE, M. D., A. M.

Read the 9th of June, 1841.

In a paper communicated by me to the Medico-chirurgical Society in the month of January last, it was pointed out, for the first time, that when a certain portion of benzoic acid, or of a soluble benzoic salt, is introduced into the human stomach, a remarkable change takes place in its passage through the kidney. The urine voided in the course of a couple of hours after its ingestion, amounting usually to five or six ounces, will be found, upon adding a twelfth part of muriatic acid, to yield by and by a copious precipitate of beautiful rose-pink acicular crystals. These, when examined by the microscope, exhibit the form of a four-sided prism, terminated by a dehedral summit. Now this is precisely the crystalline character of an acid peculiar to the urine of the horse, cow, and other graminivorous animals, and to which, for that reason, Liebig has assigned the name of *hippuric.*

By this single interchange of elements, capable of being effected only by the aid of vital chemistry, we have an organic product, uric acid, containing eight atoms of azote and ten of carbon, replaced by one, hippuric acid, containing no less than eighteen of carbon and only two of azote! In pursuing the above investigation a step further, it was ascertained that no trace whatever of uric acid or any of its salts could be discovered in the urine in question. In point of fact it had been wholly superseded by the other acid.

The important circumstance connected with this research, as bearing upon medical practice, is that the salts which this new acid forms with the ordinary bases occurring in the animal fluids, as soda, ammonia, and potash, are all of easy solu-

bility. Thus hippurate of soda requires about two parts of water at 90° Fahr. to dissolve it, whereas the corresponding uric salt, which constitutes, as it is well known, the gouty concretions or chalk stones, is acknowledged to be nearly as insoluble as uric acid; it requires at least 4000 parts of water to dissolve one. Hippurate of ammonia again is but little less soluble than hippurate of soda, while urate of ammonia will only dissolve to the amount of 1-480th part. Hippurate of lime, the least soluble of these salts examined by me, requires 18 parts of water to dissolve one.

The application of the above principle has proved of material benefit in the treatment of certain unhealthy conditions of the urine, occurring in subjects of a calculous or gouty diathesis; since it enables the practitioner to obviate entirely the various depositions resulting from excess of uric acid, the fruitful source of that most distressing malady, stone in the bladder; as also to controul and prevent the formation of the so called tophaceous concretions or chalk stones, which occasion so much inconvenience, deformity, and pain to individuals laboring under gout.

By judicious exhibition of the benzoic acid, or, according to particular circumstances of a benzoic salt, that is to say apportioning the dose to the state of the renal secretion, best previously ascertained by analysis, we can fulfil the desired indication with unerring precision, and that, as shown in the above paper, without any risk of affecting the general health, or of irritating the urinary organs.

It is to be kept in mind that this plan of treatment by no means precludes the adoption of other suitable remedial measures. Of course certain rules of diet must be observed, which there is no necessity for referring to here. It would be equally irrelevant to occupy your time with the details of cases, several of which have lately come under my notice, and go to corroborate the statements above made.

As benzoic acid is apt to irritate the fauces, unless administered in a liquid state, and as it needs a large quantity of water

to dissolve it, it will be found expedient to give it along with phosphate of biborat of soda ; since they enhance its solubility without abating its specific power. Thus, four parts, by weight, of the former, or one part and a half of the latter salt, will enable a comparatively small proportion of distilled water to take up one of the acid. This difficulty, as is obvious, does not apply to the benzoate of ammonia or of potash.

Phosphate of soda not only serves to hold benzoic acid, but likewise hippuric acid, in solution; and this is a point of some consequence, seeing that any excess of the latter acid, accidentally present in the urine, will remain dissolved by means of the neutral phosphate of soda, or the triple phosphate of soda and ammonia (microcosmic salt) naturally existing in that secretion. These phosphates, however, produce a very different effect upon the uric acid, inasmuch as they promptly convert it into urate of soda, by depriving the salt of one half of its base, and thereby transforming it into biphosphate. This fact, which recently presented itself to me in the course of some experiments, and which has not been heretofore noticed by any chemical authority, seems to furnish a simple and rational explanation of the mode of formation of urate of soda, the basis of chalk-stones. Hence, whenever the oxidizing process of the kidney is proceeding with such energy as to supply a superabundance of soluble phosphates on the one hand, and of uric acid on the other, there must inevitably result an excess of urate of soda.

Having premised the above observations with the mere view of pointing out what appears to cast some new light upon the importance of benzoic acid and its compounds, as therapeutical agents in virtue of their power of generating hippuric acid, it has appeared to me proper to indicate the distinguishing features of these two acids, as some objections have been started touching the difficulty of discriminating the one from the other. For convenience sake the leading peculiarities have been arranged in collateral order, as follows :

BENZOIC ACID.	HIPPURIC ACID.*
Crystallizes in hexagonal needles, or in white, diaphanous, pearly, flexible laminæ.	Crystallizes in four-side prisms with dehedral summits.
Is soluble in two parts of ether.	Is very sparingly soluble in ether.
Is not changed by dilute nitric acid.	Treated with dilute nitric acid, and evaporated to dryness, produces, on the addition of ammonia, a beautiful purple color.
Heated with three times its weight of hydrate of lime, generates simply benzole.	Heated with three times its weight of hydrate of lime disengages a quantity of ammonia.
BENZOATE OF AMMONIA.	HIPPURATE OF AMMONIA.
On being exposed to a strong heat, melts and flies off in benzoic acid fumes, without leaving any appreciable residuum.	Exposed to heat, melts and assumes a rose-red color forming a reddish acid; which being dissolved in water and evaporated, affords red crystals, resembling hippuric acid in their properties.
BENZOATE OF POTASH.	HIPPURATE OF POTASH
Burns without emitting any particular aromatic odor.	Heated so as to undergo decomposition, exhales the odor of bitter almonds.

On the whole sulphuric ether furnishes the readiest test for distinguishing these two acids, from the easy solubility of the one, and the difficult solubility of the other in that menstruum.

Pharmaceutical Transactions.

*The verifications were all made with hippuric acid derived from the human subject.

ART. LXIV.—ANTIDOTE TO THE SALTS OF COPPER. BY W. BENOIST, Pharmaceutist at Sancoius, (Chev.)

LIQUID albumen is at present almost exclusively adopted as an antidote for the salts of copper, since it possesses the property of decomposing and precipitating almost all the metals, and of forming albuminous compounds with the metallic oxide and the acid. But we are exposed to serious consequences in poisoning, if after having excited and facilitated emesis, we should administer to the patient a large amount of albumen, for the purpose of more certainly neutralizing the poison; what happens? The cupreous precipitate will be dissolved in the excess of albumen. If on the contrary, too small a quantity of this latter is employed, it will remain dissolved in the excess of solution of copper. To obviate this inconvenience, we have no means, for we do not know what amount of albumen is necessary to neutralize a given quantity of any salt of copper; and were this positively known, we could not properly estimate the quantity remaining in the stomach after emesis.

I am about to propose another agent which does not offer the same inconvenience; I mean, a solution of carbonate of soda, which forms with the salts of copper precipitates of a green color, insoluble in water, carbonate of copper. It is on account of its insolubility in water, that this carbonate has no action on the animal economy. I have experimented on animals; some I caused to take acetate of copper, others the sulphate, and to others I gave at the same time both the salt of copper and the alkaline solution. In every case the results were satisfactory. I caused a dog of moderate size to take 35 grains of saturated solution of carbonate of soda. This quantity, more than sufficient to neutralize the poison, did not produce any unpleasant effects. I judge that this salt may be exhibited with impunity, in large amounts, as in the above cited case it only produced some alvine evacuations. The

large quantity of carbonic acid which it contains (in 100 parts, carbonic acid 45, soda 31, water 29,) causes it to be less caustic, than the other alkaline carbonates. I have not yet had occasion to employ this in any case of poisoning in the human subject. I may observe that we ought not to lose sight of the indispensable necessity of exciting vomiting, so as to expel as much as possible the excess of poison.

Before M. Orfila had elevated toxicological science to its present rank, we may call to mind what were the means used to counteract the effects of the preparations of which I have spoken: solutions of sugar; these means being effectual how can we explain the result? It may be that the carbon of the sugar coming in contact with the oxygen of the water and of the oxide of copper, passes to the state of carbonic acid, and then the same reaction is produced as by the means I have recommended.

We have a recent example of the effect of sugar in an observation of M. Lesage, relative to a young man, who, wishing to destroy himself, took the sulphate of copper in a highly sweetened drink, and by accident escaped, the poison being thus neutralized.

From the foregoing, we may conclude that if sugar by one of its elements, may give rise to the formation of carbonic acid, and form insoluble compounds with the salts of copper, we should not be astonished that the bicarbonate of soda should possess this property in a higher degree.

Milk has also been for a long time considered an antidote to the salts of copper; the acid, it is true, separates the curd which precipitates; but it does not really render much service under these circumstances, unless it acts as a soothing application. *Jour. de Chimie Med.*

ART. LXV.—NEW PROCESS FOR THE DETECTION OF COPPER, APPLICABLE TO MEDICO-LEGAL ANALYSIS. By M. Verguin, of Lyons.

This process was suggested by an observation made some years since in analysing a mineral of copper. By accident, I placed the solution in a platinum capsule, and wishing to estimate the copper in the metallic state, placed therein a plate of iron. While the iron was not in contact with the platinum, no action took place; but the instant it came in contact with this latter, the capsule was covered with a very adherent film of copper, no precipitation taking place on the iron. The adhesion was so strong, that to separate them, nitric acid had to be used. I paid but little attention to this fact, and had almost forgotten it, when it was called to mind by reading the process of Dr. Christison, for the detection of mercury; and I sought out a simple process which might be applied to the determination of copper in medico-legal analysis. It is this which is the subject of the present note.

Before entering on the description of my process, I will rapidly examine the different reagents employed—their degree of certainty, and the case in which they will be insufficient. These reagents are ammonia, the yellow cyanide of potassium and iron, and metallic iron.

Ammonia acts by dissolving the oxide of copper, and producing a fine blue color; this color is with difficulty perceived, if—1st, the liquid tested contains a salt of which the base is precipitated by the ammonia, for then it is disguised by the precipitate. 2d, if it is colored by organic matter. It is true we may filter, and decolorise by animal charcoal—but when but little of the substance is possessed, it is very important not to lose any by the number of manipulations.

The cyanide of potassium and iron detects minute quantities of copper; for this it is necessary that the liquid should be pure, and especially that it should not contain a trace of iron,

for without this it is impossible to distinguish the brown color of the salt of copper, when mixed with the blue of the salt of iron.

Iron acts by decomposing the salt of copper and precipitates the copper in a metallic state, an action well represented by the following formula: $(\dot{Cu}\dddot{S})+Fe = Cu+(\dot{Fe}\dddot{S})$, where we may see that the iron takes the place of the copper, and when the reaction terminates, we have sulphate of iron and metallic copper. But it is necessary that the liquid should be acidulated by a little acid; but if too much be added and the copper be in small amount, the iron blackens, and prevents the copper being readily distinguished. Moreover, the copper does not adhere, and the least disturbance causes it to separate.

These uncertainties do not exist in the process which I am about to describe, and which is no more than the application of the observation of which I spoke in the commencement.

It is proper that the liquid to be examined, if it be dilute, should be somewhat concentrated, and slightly acidulated with hydrochloric acid; a drop is to be placed on a plate of platinum, and covered with a well polished plate of iron, in such a manner that the iron shall touch both the liquid and platinum. In a few seconds the platinum exhibits a very adherent covering of copper throughout every part touched by the liquid. The explanation of this fact depends entirely upon electro-chemical theory; it results from principles which I shall rapidly enumerate: 1st, when two metals are placed in contact, there is a production of electricity, one of the metals being positively and the other negatively electrified. 2d, when a solution is subjected to the action of the pile, the salt is decomposed, the acid passing to the positive, and the base to the negative pole. There are some salts which are not only thus decomposed into acid and base, but still further the base itself is decomposed into metal and oxygen; in this case, the metal only passes to the negative pole, the oxygen appearing at the positive pole.

But, when iron and platinum are placed in contact, there is a developement of electricity, which developement is the more active when a saline solution is present; the iron becomes

positive, the platinum negative. The salts of copper have the property of being decomposed not only into acid and base, but into oxygen and metal. Hence the acid being more oxygenated is transferred to the iron or positive pole, while the metal is fixed on the platinum or negative pole.

Such is the process which I offer as most exact, and not liable to the uncertainties of the other methods. It is simple, does not require any manipulation which may not be performed by persons with but a slight chemical knowledge, and I believe will be found useful in medico-legal experiments.

Jour. de Pharm.

MISCELLANY.

On the preparation of Chloride of Potassa. By Professor GRAHAM.—It is well known that the ordinary processes for this important salt are attended with some practical difficulties. When a stream of chlorine gas is passed through a strong solution of carbonate of potassa, the absorption of the gas is rapid and complete, till one half of the alkaline carbonate is decomposed; but the remaining portion, which is in a state of bicarbonate, is not so easily acted upon. To decompose the latter salt completely, chlorine must be applied in excess, and the decomposition is attended by the formation of free hypochlorous acid, as has been proved by M. Detmer. The liquid is also at the end highly bleaching, and contains much hypochlorite of potassa. The boiling necessary to convert the latter into chlorate of potassa and chloride of potassium, occasions, according to M. Morin, a considerable loss of oxygen, and thus lessens the product of the chlorate. When a strong solution of caustic potassa is substituted in this process for the carbonate, the absorption of chlorine proceeds without interruption; but the liquid, when saturated, bleaches strongly from hypochlorite formed. A long-continued boiling is required to destroy this property completely, and as oxygen escapes, the chlorate obtained must be deficient in quantity in a correspondent proportion. The process which the author recommends, and which is attended by none of these inconveniences, consists in mixing carbonate of potassa intimately with an equivalent quantity of dry hydrate of lime, and exposing the mixture to chlorine gas. This mixture, although quite dry, absorbs the gas with prodigious energy; the temperature rises much above 212°, and water is freely evolved. When saturated, it may be moderately heated, which destroys a mere trace of hypochlorite it contains. The whole lime is found in the state of carbonate, and the potassa in the state of chlorate of potassa and chloride of potassium. The solution of the two latter salts is neutral, without any bleaching property, and free from lime. The chlorate of potassa may be crystallized from it in the usual way. Carbonate of potassa, when moistened and exposed to chlorine, without the hydrate of lime, absorbs the gas with great avidity, and certainly answers better than a strong solution of the same salts; but the absorption becomes slow after the salt is in the state of bicarbonate, and subsequently a large

quantity of the bleaching hypochlorite of potassa is produced. In the new process described above, there is no reason to believe that the carbonate of potassa is decomposed by the dry hydrate of lime till the chlorine is presented to the mixture; then, while the lime attracts the carbonic acid, the chlorine acts simultaneously upon the potassa, and the carbonate of potassa is thus readily decomposed. The same principle of calling in a secondary agency to promote combination, may be taken advantage of in many other cases. Thus hydrate of lime, dry or slightly damped, ceases to absorb sulphuretted hydrogen long before it is saturated with that gas; but, if mixed with an equivalent of hydrated sulphate of soda, the absorption takes place with greatly increased avidity, and goes on until two equivalents of sulphuretted hydrogen are taken up for one equivalent of lime. But here, with the assistance of sulphuretted hydrogen, the hydrate of lime decomposes the sulphate of soda, sulphate of lime being formed, while caustic soda combines with the sulphuretted hydrogen.

Lond., Edin. and Dub. Phil. Mag.

Action of Acids on Sulphate of Iron. By M. Callond, (d'Ancey.)—I have made an observation which appears to me to be new, which, by the advice of my colleagues, I make known to chemists, to examine more particularly the phenomena, and produce, if possible, an explanation.

The proto-sulphate of iron, placed in contact in the cold with strong sulphuric acid, assumes a more or less intensely red colour. I have observed that on adding a small quantity of water, and agitating slightly, so as to disturb the red colour, this presents the fine appearance of the vapour of iodine.

Sulphuric acid, which does not produce this effect, either from its want of strength or from the presence of organic matter, may be caused to acquire this remarkable property by being boiled with a few drops of nitric acid for a length of time sufficient to drive off the nitric oxide formed.

If the sulphuric acid produces the new character with the salt in only an insensible or slight degree, one drop of nitric acid will develope it rapidly; and when the glass is long and narrow, a variety of violet red zones will be observed. That portion which is not in contact offers no colour. When mixed the whole colour disappears. When water is added to the most intensely red product, the colour likewise disappears.

I do not believe that this is in consequence of oxidation. On the first contact with the acid, the surface of the salt shoots out small crystals and becomes white, probably passing to the anhydrous state. If the sulphate becomes oxidized, the liquid presents more or less of a red colour.

Nitric acids alone does not produce upon the salts any variation but what is known.—*Jour. de Chim. Med.*

Arsenic in Muriatic Acid.—At the session of the Academy of Science on the 20th of September, Prof. Dupasquier, of the School of Medicine of Lyons, read a paper entitled "Memoir on the presence of arsenic in the Hydrochloric Acid of commerce, and consequently, in the same acid purified for the use of pharmaceutists and chemical laboratories." The author sums up his results as follows:

1st. That some commercial muriatic acid is found to contain arsenic.

2d. That such acid, purified by the process ordinarily employed in laboratories, furnishes a hydrochloric acid equally arseniferous.

3d. That the amount of arsenic contained in such acid is quite appreciable. A kilogramme of muriatic acid, purified by distillation, gave an amount of sulphuret equal to gr. 0.722, almost a gramme of arsenious acid.

4th. The arsenic contained in this acid is derived from sulphuric acid used in the manufacture, which being obtained from pyrites, contains arsenic.

5th. Experiment has proved that the arsenic does not exist in the state of arsenious acid, but as a chloride, which accounts for its great volatility, and its presence in the distilled acid.

6th. Arsenious acid, then, is converted into chloride and water by the action of hydrochloric acid, which offers an explanation of the action of this hydracid upon arsenious acid less soluble in pure water.

7th. The use of an arseniferous hydrochloric acid may occasion serious inconvenience, in chemical research, and in the arts.

8th. This arseniferous acid may also give rise to serious danger, if employed as a remedy, or an ingredient of compounds.

9th. The use of this acid is particularly dangerous in medico-legal examinations, when hydro-sulphuric acid is employed upon a liquid supposed to contain arsenic, since an arsenical precipitate will be found, although none of this poison be contained in the suspected liquid.

M. Dupasquier recommends the following mode of rendering the acid pure:—mix equal quantities of the acid and water; subject the mixture to a current of hydro-sulphuric acid; separate the sulphuret which results, first uniting it by shaking it together. Acid thus diluted may be filtered through paper. It is perfectly colourless, and gives no spot with Marsh's apparatus. It is true that this mode weakens the acid somewhat, but this may be avoided in some measure, by using less water, or by redistilling and collecting the gas in less water.

Robiquet, some time since, had communicated to the Journal de Chimie Medicale, that hydrochloric acid might contain arsenic; which he attributed either to the sulphuric acid, or the cast-iron cylinders in which the chloride of sodium is decomposed.—*Jour. Chimie. Med.*

At the same sitting, MM. Forbes and Gelis communicated that in using Marsh's apparatus, several specimens of purified zinc, and containing not

the least sulphur, they have remarked repeatedly, the production of appreciable quantities of hydro-sulphuric acid; this can only be attributed, say they, to the partial reduction of the sulphuric acid, by the nascent hydrogen.

This is regarded, by the reporters, as an interesting fact, since it shows that when hydro-sulphuric acid is generated in an acid liquid, containing arsenious acid, a mutual action should ensue, giving rise to the formation of sulphuret of arsenic, the presence of which would not be revealed by Marsh's method, as the gentlemen have assured themselves—hence in cases where the quantity of arsenic is small, it may either escape his notice altogether, or else be so feebly indicated as to fail in establishing conviction.—*Ibid.*

Urinary Calculi composed of Cholosterine.—In a letter addressed to the editor of the Journal de Chimie Medicale, M. Batilliat renews the assertion which he had previously made, that he had met with urinary calculi composed of cholosterine, and the accuracy of which assertion had been questioned by M. Pelletan. It appears that on the occasion of this fact being reported for the first time, M. Pelletan questioned the possiblity of the concretion being other than of biliary origin. In reply, M. Batilliat says that it is the duty of the chemist to be satisfied with determining the composition of concretions which are submitted to him for examination, and to allow to physiologists the explanation of their origin and formation. He then renews the statement in the following words:—"It is not the less certain, that the calculi of which I spoke are derived from the urine, and are composed of cholosterine, as M. Pelletan is himself well assured."

This is a case sufficiently remarkable to be ranked among urinary concretions.—*Ibid.*

Crystals of Sulphur in the compound tincture of Cochlearia.—The presence of sulphur in the plants of the natural family Cruciferæ, cannot, at the present day, be called in doubt, as every one knows that it is a constituent of the volatile oil of these plants. I do not know, however, that any one since Baumé, has announced the detection of crystals of sulphur in a preparation obtained from the plants by distillation. We have lately collected a small quantity from the compound tincture of cochlearia, prepared July, 1840, and which was exposed to cold, the last winter. To satisfy ourselves that the crystals were really sulphur, we projected them on burning coals, and perceived them to burn with a blue flame, and to give off the characteristic odour of sulphurous acid.—*Ibid.*

On the Distilled Water of Bitter Almonds. By Jacob Bell.—The subject was introduced by an allusion to the use of this remedy as an external application, by several medical men, among whom were mentioned the

names of Dr. Hodgkin, Mr. May, of Tottenham, and the late Dr. Sims, Physician to the Marylebone Infirmary.

The following is a quotation from a communication with which Dr. Hodgkin had favored the author:—

"The principal use to which I have applied the Bitter Almond Water has been as a means of allaying distressing itching, whether *prurigo senilis*, or the local varieties of the affection in which the itching is almost intolerable. In some of these cases, and especially in *prurigo ani*, I have found it singularly useful. In employing it pretty extensively I have observed that whilst in some cases I obtained an immediate and gratifying effect, in some others it appeared to produce no benefit, but caused smarting and irritation. From this I was induced to believe that it affects different skins differently, as is the case with oil of turpentine, in consequence of peculiarities in individual sensibility. I have sometimes prescribed the Water of Bitter Almonds, diluted with distilled water, but never met with any inconvenience following the use of the former undiluted, except the smarting above mentioned."

"An efficient substitute may be obtained extemporaneously by having recourse to the essential oil.

"The strength of wash employed by Edward May is a drop to the ounce, which is prepared by adding a solution of the oil in spirit to water. He keeps this solution of a known strength, one part of the oil to seven of the spirit answers the purpose very well. He uses the same preparation as a substitute for hydrocyanic acid for internal administration; gives about half a drop for a dose, and finds that it has the advantage of being palatable as well as efficacious."

Mr. Bell then proceeded to consider the constitution of the oil of bitter almonds, with a view to determine the nature of its properties as a medicinal agent.

The oil of bitter almonds, of which the water is a saturated solution, has been minutely analysed by Robiquet, Pelouze, and other French chemists, and a paper on the subject, written by MM. Wohler and Liebig, is to be found in the *Annales de Chimie et Physique, Vol. LI.* The oil which comes over in distillation is a compound of a peculiar essential oil with hydrocyanic acid. The acid may be separated by adding liquor potassæ and protochloride of iron and re-distilling. The oil which is thus obtained is colorless, and has a specific gravity of 1.043. By exposure to the atmosphere or to oxygen, it is converted into benzoic acid; which process depends on a change in the elements. The oil is a compound of *benzule* and *hydrogen*, one equivalent of each. It is, therefore, a hyduret of benzule, while benzoic acid is a compound of *benzule* and *oxygen*, or an oxide of benzule.

M. Liebig thus explains the decomposition :—

"When oil of bitter almonds is exposed to the air, it absorbs two equiv-

alents of oxygen, and is converted into benzoic acid; but half the oxygen absorbed combines with the hydrogen of the oil and forms water, which remains in union with the anhydrous benzoic acid."*

Neither this oil nor the hydrocyanic acid pre-exist in the almond, but are developed by the action of the water, during distillation.

Mr. Bell then made the following allusion to hydrocyanic acid in the state in which it is usually employed in medicine.

The powerful effects of hydrocyanic acid, and the danger which is likely to result from inaccuracy in the dose, render uniformity in its strength of the highest importance, whilst its volatility and liability to decomposition occasion considerable difficulty in attaining this object.

Every time the stopper is removed from a bottle containing it, a portion of the real acid escapes, and although the quantity which is liberated at each time may be unappreciable, it is clear that when a bottle, containing an ounce or two, is nearly emptied in the usual routine of dispensing, the remaining portion must be considerably reduced in strength. This may serve to explain a circumstance which has occasionally excited the surprise of medical men, that after having daily increased the dose, with careful attention to the effects up to a certain point, a very slight accession, or even a repetition of the last dose, has been known to produce violent and alarming symptoms. It has, in several instances, been discovered on investigation, that the last mixture was prepared from a fresh bottle of acid, which had not lost strength by exposure, while the former acid, by becoming gradually weaker, had misled the practitioner in estimating its effects. The extreme difficulty of guarding against this inconvenience, especially where the demand is not sufficient to ensure a rapid consumption, is a subject of much importance. Dr. A. T. Thomson has proposed that hydrocyanic acid should be kept in four or six ounce bottles diluted with water in the proportion of a drop or two to the ounce, by which means a fresh bottle would be opened for almost every prescription. This plan might answer the purpose when water is the vehicle ordered, but when this is not the case we have no alternative but to keep the acid of the medical strength, and to dispense it from a very small bottle.

The hydrocyanic acid of Scheele contains five per cent., by weight, of real acid; that of the pharmacopœia is about two-fifths of the above strength. This fact unfortunately is not generally known in the profession, and Scheele's acid having been a long time taken as the standard, is habitually prescribed by many practitioners. When the word "Scheele" is not inserted in the prescription, and the acid of the Pharmacopœia is employed, the patient receives only two-fifths of the dose intended, and the reputation of the dispenser is injured by the inefficacy of the medicine.

*"Organic Chemistry, in its application to Agriculture and Physiology," by Justus Liebig, M. D. &c.

Several instances might be mentioned in which chemists have thus undeservedly been accused of using "hydrocyanic acid which was good for nothing."

As many practitioners almost entirely avoid prescribing hydrocyanic acid, on account of the difficulty of preservingit ofa uniform strength, and as others are in the habit of using the oil of bitter almonds as a substitute, the comparative merits of the two remedies claim our attention; we, therefore, look to the medical profession for information on this point.

Pharmaceutical Transactions, of Sep. 1, 1841.

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Subscriptions received by the Publishing Committee.

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